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PROCEEDINGS
OF THE
LINNEAN SOCIETY OF LONDON.



121ST SESSION.

FROM NOVEMBER 1908 TO JUNE 1909.

LONDON:
PRINTED FOR THE LINNEAN SOCIETY,
BURLINGTON HOUSE, PICCADILLY, W.,
BY TAYLOR AND FRANCIS, RED LION COURT, FLEET STREET.

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Publications of the Society issued during the period, 31st July, 1908., to 31st July, 1909 :—

Journal (Botany), No. 267, 13th Oct., 1908.
 „ 268, 15th Feb., 1909.
 „ 269, 11th Mar., 1909.
 „ (Zoology), No. 198, 30th Sept., 1908.
 „ 199, 6th July, 1909.
 „ 204, 11th Nov., 1908.
 „ 205, 8th Mar., 1909.

Transactions (2nd Ser.) Botany, Vol. VII. Part	x., Dec. 1908.
"	xi., Feb. 1909.
"	xii., July 1909.
" (2nd Ser.) Zoology, Vol. XI. Part	i., Dec. 1908.
"	ii., Mar. 1909.
"	iii., Apr. 1909.
"	iv., June 1909.
"	v., July 1909.

Proceedings, 120th Session, from November 1907 to June 1908:
October 1908.

List of [Fellows, Associates, and Foreign Members], 1908-1909.

PROCEEDINGS
OF THE
LINNEAN SOCIETY OF LONDON.

(ONE HUNDRED AND TWENTY-FIRST SESSION,
1908-1909.)

November 5th, 1908.

Dr. D. H. SCOTT, M.A., F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 18th June, 1908, were read and confirmed.

Miss Grace Wigglesworth, M.Sc. (Manch.), and Capt. Andrew Thomas Gage, I.M.S., were admitted Fellows.

The following were proposed as Fellows:—Lieut.-Col. Charles James Bamber, I.M.S., Mr. Ernest Brown, Mr. Ernest Gibson, Mrs. Mary Jane Longstaff, Mr. Ashley Henry Maude, Miss Mary (May) Rathbone, Miss Agnes Robertson, D.Sc. (Lond.), Miss Ethel Nancy Thomas, B.Sc. (Lond.), and Miss Anita Florence Seed Williams, B.Sc. (Lond.).

Mr. Joseph Pearson, M.Sc., was balloted for and elected a Fellow.

A silver copy of the Darwin-Wallace Medal was presented to the British Museum: Mr. H. A. GRUEBER, F.S.A., the Keeper of the Department of Coins and Medals, received it on behalf of the Museum, and expressed his pleasure in accepting for his Department so noteworthy a medal.

Prof. A. DENDY, F.R.S., Sec.L.S., exhibited bronze copies of the new Research Medal instituted by the New Zealand Institute,
LINN. SOC. PROCEEDINGS.—SESSION 1908-1909.

as a memorial to Capt. Hutton, F.R.S.; it had been modelled by Prof. E. Lanteri, showing on the obverse a portrait of Hutton, and on the reverse *Sphenodon punctatus*, *Apteryx*; *Phormium tenax*, *Cordyline australis*, and a *Celmisia* for the fauna and flora, whilst geology was represented by a geologist's hammer and a distant range of volcanoes.

Mr. L. A. BOODLE, F.L.S., exhibited a preparation and drawings of a remarkable gall sent from Bombay by Mr. W. A. Talbot, F.L.S., Conservator of Forests. Prof. Trail and Dr. Stapf discussed certain points, and Mr. Boodle replied.

Dr. OTTO STAPF, F.R.S., Sec.L.S., referred to Mr. Scott Elliot's problematical plant, described and discussed in Journ. Linn. Soc., Bot. vol. xxx. (1894) p. 155, t. 8, and identified by M. H. Hua with *Lepidagathis Pobeguini*. He produced one of Scott Elliot's specimens, and explained how from the presence of cystoliths in the epidermis in connection with the peculiar distribution of the phloëm in the stem the affinity of the plant might have been ascertained in spite of the absence of inflorescences.

The President, Miss A. L. Smith, and Mr. Boodle commented on the exhibition.

The following papers were read:—

1. "Notes on some Parasitic Copepoda, with a description of a new species of *Chondracanthus*, i. e. *C. inflatus*." By Miss MAY E. BAINBRIDGE, B.Sc., F.L.S.
2. "On some Nemerteans from the Eastern Indian Ocean." By R. C. PUNNETT, M.A., and C. FORSTER COOPER, M.A. (Communicated by J. STANLEY GARDINER, M.A., F.R.S., F.L.S.)
3. "Report on the Echinoderms (other than Holothurians) collected by Mr. Stanley Gardiner in the Western parts of the Indian Ocean." By Prof. F. JEFFREY BELL, M.A. (Communicated by the same.)

November 19th, 1908.

Dr. D. H. SCOTT, M.A., F.R.S., President, in the Chair.

On taking the Chair, the President announced that, accompanied by Dr. Stapf and the General Secretary, he had been received in audience by H.M. the King of Sweden, at Windsor, who signed the Roll and Charter Book as an Honorary Member.

The Minutes of the General Meeting of the 5th November were read and confirmed.

Mr. William Booth Waterfall was proposed as a Fellow.

Miss Eleanor Pearse, B.Sc. (Lond.), and Mr. James Moore Williams were severally balloted for and elected Fellows.

Mr. HAROLD WAGER, F.R.S., F.L.S., gave a lantern demonstration on "The Optical Behaviour of the Epidermal Cells of Leaves." He stated that Professor Haberlandt had suggested that the epidermal cells of certain leaves are functional as ocelli or primitive eyes and are capable of the perception of light. The structure of these cells is such that the rays of light which fall upon them are refracted and brought to a focus, and in one case Haberlandt was able to obtain a photograph of a microscope the image of which was focussed upon the basal walls of the epidermal cells. This image, as figured in his book, is not very clear, and it has since been found possible to obtain much clearer images of a variety of subjects through the cells both of the upper and lower epidermis of many leaves, including portraits from life, flowers, houses and landscapes, reproductions of photographs and pictures, and simple diagrams in colour on the autochrome plates of Messrs. Lumière.

In order to explain this lens-function, Haberlandt has put forward the extremely interesting hypothesis that the convergence of the light rays causes a differential illumination of the protoplasmic layer on the basal walls of the epidermal cells and sets up a stimulus which results in the orientation of the leaf into that position in which it can obtain the most suitable illumination.

There is no doubt a good deal of evidence in favour of Haberlandt's view, but there are many facts to be explained before a definite conclusion can be arrived at. For example—convergence takes place in the lower as well as in the upper epidermal cells, as shown by Albrecht for *Viscum* and by the exhibitor in many other plants. In a species of *Mesembryanthemum* there are special lens-cells equally well developed on the lower surface as on the upper surface. In *Garrya elliptica* also there are special lens-shaped thickenings of the cuticle equally well developed on both surfaces. The papillate cells of many petals show a very clear convergence.

It is not impossible that the convergence may bring about a more efficient illumination of the chlorophyll grains. Haberlandt himself suggested something of this kind many years ago, and the numerous observations which have been made upon *Schistostega*, *Osmundaceæ*, some *Selaginellas* and *Hepatics*, and other plants, and some observations by the exhibitor upon *Botrydium granulatatum*, all clearly indicate that this hypothesis must be taken into account. It is significant, also, that epidermal cells with long focus appear to be associated with long palisade-cells, whilst the cells with short focus are associated with short palisade-cells.

The President and Dr. S. E. Chandler commented on the exhibition, and the Author replied.

Mr. C. T. DRUERY exhibited some ferns growing in a bottle presumably airtight, on silver sand, which during a period of four years had nearly filled the jar. The question he propounded was, How did this vegetative growth procure the needful carbon dioxide?

Mr. G. P. Mudge (visitor), Dr. Rendle, and Dr. Drabble engaged in a short discussion on the point raised.

The Rev. JOHN GERARD, S.J., showed a series of lantern-slides: (a) illustrating Yew stems naturally inarched, from Stonyhurst, Lancashire; and (b) *Wistaria* stems, one of which having been twined round a pillar "clock-wise" fashion, had ceased to put forth fresh shoots, though still living. The other, having twined itself "counter-clockwise," had flowered freely. Dr. Rendle, Mr. J. C. Shenstone, and the President joined in the discussion which followed.

Miss A. L. SMITH showed under the microscope and by lantern-slides, *Myxococcus pyriformis* or *M. rubescens* (?), a British member of the Myxobacteriaceæ, which had also been found near Berlin.

The Rev. T. R. R. STEBBING exhibited specimens of an Alcyonarian evidently belonging to the suborder Pennatulacea, and not improbably to the widely distributed species *Cavernularia obesa*, Milne-Edwards & Haime, in Kölliker's family Cavernulariidae. They had been sent from Borneo some years ago by Charles Hose, Esq., D.Sc., at that time the Resident in the Baram district, Sarawak. The suggested identification was founded on Professor S. J. Hickson's discussion of the species in Gilchrist's 'Marine Investigations,' vol. i. p. 92, pl. 3 (1902), and on inspection of a specimen in the British Museum under the care of Professor Jeffrey Bell. Mr. Stebbing pointed out that the genus *Cavernularia* was established in 1850 by Milne-Edwards & Haime (British Fossil Corals, part i. p. lxxxiv), and should not be credited to Valenciennes who only gave the name in manuscript on a museum label. A similar remark applies to the species *C. obesa*. The largest of the specimens is about three and a half inches or 87 mm. in length. When received in England, and for months afterwards, they had the appearance of slender, almost smooth, light-brown sausages, besprinkled, except for a still smoother fifth or sixth of their length, with small black dots. The chief motive for bringing them under the notice of the Society lay in the circumstance that, when again examined after a further long interval, during all which time they had been in a preservative medium, the specimens displayed for the most part an entirely different aspect. The surface had become in many parts conspicuously squamose, and from many of the black dots polyps were now more or less expansively protruded. It looked as if by their power of withdrawal into the common fleshy polypidom, these creatures were

able for an immense time to resist the poisoning influence of spirit or formalin, but Prof. Dendy suggested that a *post-mortem* shrinkage of the polypidom might have protruded the polyps.

The following papers were read :—

1. "On a new Species of *Symphyla* from the Himalayas." By Prof. A. D. IMMS, D.Sc. (Communicated by A. E. SHIPLEY, F.R.S., F.L.S.)
2. "The Freshwater Crustacea of Tasmania, with remarks on the Geographical Distribution." By GEOFFREY W. SMITH, M.A., F.L.S.

December 3rd, 1908.

Dr. D. H. SCOTT, M.A., F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 19th November were read and confirmed.

Mr. George Edward Nicholls, B.Sc., Miss Eleanor Pearse, B.Sc., and Mr. Albert William Bartlett, B.A., B.Sc., were admitted Fellows.

Mr. William John Vandenberg was proposed as a Fellow.

The following persons were severally balloted for and elected Fellows :—Lieut.-Col. Charles James Bamber, I.M.S., Mr. Ernest Brown, Mr. Ernest Gibson, Mrs. Mary Jane Longstaff, Mr. Ashley Henry Maude, Miss Mary (May) Rathbone, Miss Agnes Robertson, D.Sc. (Lond.), Miss Ethel Nancy Thomas, B.Sc. (Lond.), and Miss Anita Florence Seed Williams, B.Sc. (Lond.).

Dr. O. ROSENHEIM exhibited a large series of lantern-slides prepared by the starch-grain colour process, and explained the method by which these results had been obtained. The President, Mr. J. C. Shenstone, Mr. A. P. Young, Mr. A. O. Walker, and Dr. V. H. Veley, F.R.S. (visitor), contributed some remarks, and Dr. Rosenheim replied to the questions which had been put.

The following papers were read :—

1. "Biscayan Plankton: the Ostracoda." By Dr. G. HERBERT FOWLER, F.L.S.
2. "Mimicry in Spiders." By R. INNES POCOCK, F.L.S., F.Z.S.
3. "Note on *Juniperus taxifolia*, Hook. & Arn." By B. HAYATA. (Communicated by W. BOTTING HEMSLEY, F.R.S., F.L.S.)

December 17th, 1908.

Dr. D. H. SCOTT, M.A., F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 3rd December were read and confirmed.

Miss Anita Florence Seed Williams, B.Sc. (Lond.), Miss Ethel Nancy Thomas, B.Sc. (Lond.), Mr. Charles Francis Ullathorne Meek, and Mr. Ashley Henry Maude, J.P., were admitted Fellows.

Mr. Richard Dupont, Mr. William Herbert Mullens, M.A., LL.M., and Mr. Gurney Wilson were proposed as Fellows.

Mr. William Booth Waterfall was elected a Fellow.

Mr. RUPERT VALLENTIN, F.L.S., exhibited a rare barnacle, *Lepas fascicularis*, obtained in July last off the Scilly Isles, and the coral *Dendrophyllia cornigera* dredged in St. Ives Bay. The Rev. T. R. R. Stebbing contributed some observations with regard to this and other barnacles.

Mr. W. C. WORSDELL, F.L.S., exhibited living specimens of various forms of *Selaginella*, and remarked that in *Selaginella inequalifolia*, Spring, *S. Willdenovii*, Baker, *S. canaliculata*, Baker, *S. serpens*, Spring, *S. Mettenii*, A. Br., he observed rhizophores which had grown out spontaneously into leafy shoots. The mode in which this takes place shows that the rhizophore has the morphological character of a shoot, as there is clearly but a single organ here concerned, and there is no question of the shoot developing out of an organ of a different nature represented by the extreme base of the whole structure. The *exogenous* origin of the normal rhizophores, the fact that the two (upper and lower) at the base of each dichotomy of the stem form therewith a *tetrachotomy*, two arms of which are in a plane at right angles to the other two, and their *constant, definite* place of origin, are all in favour of their shoot-nature. Transitions occur between the normal rhizophore and the extreme leafy form.

The rhizophore is probably homologous with the "protocorm" of *Lycopodium* and *Phylloglossum*, and with the organ known as *Stigmaria*; if so, it follows that both the "protocorm" and *Stigmaria* are also of shoot-nature. It is very unlikely that organs intermediate between shoot and root can exist in Nature.

The President remarked upon the interest of this exhibition.

The third exhibition was by Mr. GEORGE MASSEE, F.L.S., who exhibited preserved specimens, and lantern-slides of the "Black Scab" of potatoes. During the past few years this disease, caused by a parasitic fungus, has assumed the proportions of an epidemic

in various parts of this country. The tuber is the part most frequently attacked, but very young leaves are sometimes infected. In tubers the young "sprouts" are attacked, and owing to the stimulation induced by the parasite in infected sprouts rapidly increase in size and form large coralloid masses or warts, which frequently cover the greater portion of the surface of the tuber. These masses eventually become blackish-brown in colour, due to the presence of myriads of dark-coloured resting-spores.

Infection always takes place from without, consequently the epidermal or peripheral cells alone are infected. The presence of mature resting-spores imbedded deeply in the tissue of the host, at first sight appears to contradict this statement, but this appearance is due to the rapid growth and division of uninfected epidermal cells, which soon form a tissue superposed on what was previously the periphery.

A point of interest in connection with this disease is the absence of periderm, which in other diseases of potato tubers is so readily formed. On germination, the inner, thin hyaline wall is extruded in the form of a sphere, through a crack in the thick coloured outer wall of the resting-spore. The thin wall of the extruded inner membrane soon deliquesces, and liberates myriads of elliptical, uniciliate zoospores.

The facts that the host is infected through the epidermal or peripheral cells, and the extrusion of the inner wall of the resting-spore as a sphere, from which the zoospores escape in an active condition, indicate that the parasite belongs to the old and well-known genus *Synchytrium*.

What happens to the zoospores after their liberation into the ground remains to be discovered, but experiments conducted at Kew prove that soil once infected produced a diseased crop even after a period of five years.

Prof. Dendy, Mr. A. P. Young, and the President contributed some remarks, and Mr. Massee replied to certain questions.

Messrs. H. & J. GROVES, F.L.S., exhibited specimens of *Luzula pallescens*, Besser, collected in Woodwalton Fen, Hants, by Mr. J. Groves in company with Mr. E. W. Hunnybun, who discovered the plant there last year. *L. pallescens* has previously been recorded as British from specimens collected by the Rev. Augustin Ley in 1898 at Presteign, Radnorshire; but on examination of Mr. Ley's specimens, they proved to be merely a pale state of *L. erecta*. In Messrs. Groves' opinion the differences between *L. pallescens* and *L. erecta* were sufficient to warrant their being regarded as distinct species; the principal characteristics of *L. pallescens* being the very numerous smaller oval heads, the much smaller perianths and fruits, and the minute seeds, besides which there was a great difference between the outer and inner perianth-segments. Though originally described from Scandinavia by Wahlenberg (under the genus *Juncus*), the headquarters

of *L. pallescens* appears to be Eastern Central Europe. Messrs. Groves also exhibited specimens of the allied species.

Dr. OTTO STAPF, F.R.S., Sec.L.S., exhibited, for comparison, specimens of *L. pallescens* from Central Europe.

Dr. Stapf, Mr. G. C. Druce, and Mr. F. N. Williams engaged in a discussion, and Mr. James Groves replied.

Mr. G. CLARIDGE DRUCE, M.A., F.L.S., exhibited as a probable new British plant, *Montia lamprosperma*, Chamisso; the characters by which it is distinguished from *M. fontana* being, it was stated, the larger, chestnut-brown shining seeds, reticulate rather than tubercular. In *M. fontana* they are small, dull-black, and strongly tubercular. The plant has a distinctly northern range, and from its being the only form found in the Faeroes, and from its occurrence in Scandinavia, Russia, and North Germany, it might be expected to grow in Scotland. Mr. Druce has specimens which he found in Ross-shire in 1881 in Glen Spean, and on Loch na Gar, the latter at an altitude of 3400 feet.

Mr. Clement Reid believed he had met with the seeds of both species in his researches in British leaf-beds.

Mr. F. M. BURTON, F.L.S., sent for exhibition an oyster-shell with a remarkably large calcareous concretion formed at the point of attachment of the adductor muscle. Prof. Herdman, to whom the shell had been shown, considered the phenomenon due to some parasitic infection which had caused irritation, and consequent growth. There was no trace of any animal having bored in from the outside at the place.

The following papers were read:—

1. "The Anomura of the Sudanese Red Sea." By W. RIDDELL. (Communicated by Prof. W. A. HERDMAN, F.R.S., V.P.L.S.)
2. "Forms of Flowers in *Valeriana dioica*." By R. P. GREGORY. (Communicated by Prof. A. C. SEWARD, F.R.S., F.L.S.)
3. Rhynchota obtained during the 'Sealark' Expedition." By W. L. DISTANT. (Communicated by J. STANLEY GARDINER, F.R.S., F.L.S.)
4. "Etudes sur les Cirrhipèdes du Musée de Cambridge." By Prof. A. GRUVEL. (Communicated by the same.)

January 21st, 1909.

Dr. D. H. SCOTT, M.A., F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 17th December, 1908, were read and confirmed.

Miss Agnes Robertson, D.Sc., was admitted a Fellow

Mr. David Reekie was proposed as a Fellow.

Mr. William John Vandenberg was elected a Fellow.

Dr. OTTO STAFF, F.R.S., Sec.L.S., exhibited male and female specimens of *Plagianthus Helmsii*, F. Muell. & Tate, and demonstrated with the aid of lantern-slides their peculiar leaf and floral structure, pointing out at the same time, that it appears more natural to treat this species together with *Plagianthus microphyllus* and *P. squamatus* as members of a distinct genus for which Mueller's name *Halothamnus*, originally applied to *P. microphyllus*, would have to stand.

Prof. Dendy, Sec.L.S., Mr. E. G. Baker, and Mr. T. A. Sprague took part in a discussion, and Dr. Staff replied.

The following papers were read:—

1. "The Longitudinal Symmetry of Centrospermæ." By Prof. P. GROOM, M.A., F.L.S.
2. "The Genus *Nototriche*, Turcz." By ARTHUR W. HILL, M.A., F.L.S.

February 4th, 1909.

Dr. A. SMITH WOODWARD, F.R.S., Vice-President,
in the Chair.

The Minutes of the General Meeting of the 21st January, 1909, were read and confirmed.

Mr. Frank Campbell McClellan was admitted a Fellow.

Mr. William Ambrose Clarke, Mr. Frank Hicks, and Miss Ida Mary Roper were proposed as Fellows.

Mr. Paul Rivalz Dupont, Mr. William Herbert Mullens, M.A., LL.M., and Mr. Gurney Wilson were severally balloted for and elected Fellows.

The Chairman announced that sets of the Portraits which form part of the Darwin-Wallace volume have been printed in quarto form, and are purchasable by the Fellows at two shillings per set, post-free.

Prof. W. A. HERDMAN exhibited microscope-slides prepared by one of his pupils, Mr. W. J. Dakin, now working at Naples, showing striped muscle-fibre in the mantle of *Pecten*.

The Rev. E. S. MARSHALL showed the following interesting British plants :—

“*Saxifraga nivalis* × *stellaris*, n. hybr., found in 1902 on Cairngorm by the late Mr. F. C. Crawford, F.R.S.E. (after whom it was proposed to name it). Specimens only in flower, but quite intermediate in character.

Orchis ——. Found by Mr. W. A. Shoolbred and himself, in quantity, at Inchnadamph, W. Sutherland. Clearly a new form, at least for Britain; allied to *O. maculata*, L. A drawing by Mr. E. W. Hunnybun is shown, besides good specimens.

Helianthemum Chamæcistus × *polifolium*, from Purn Hill, Bleadon, N. Somerset. First observed by Mr. H. S. Thompson. A good intermediate; apparently quite fertile.

Hieracium hyparcticum (Almq.) Elfstrand. First found by Mr. F. J. Hanbury and himself in 1890 at Inchnadamph, and again gathered in 1908. A modification of a South Greenland species.

Hieracium eustales, Linton, from E. and W. Sutherland. An endemic species, previously known only from about four Perthshire stations.”

Mr. Henry Groves remarked upon the excellence of the dried specimens exhibited.

This exhibition was followed by Prof. F. E. WEISS, who showed some specimens of *Compsopogon*, a tropical freshwater alga belonging to the Rhodophyceæ, which has been found in the Reddish Canal near Stockport. The water in this part of the canal is warmed by the inflow of hot water from the cotton mills, and other subtropical aquatics have been found there in the past — *Najas graminea*, *Chara Braunii*, and *Pithophora Oedogonia*. They are supposed to have been introduced with refuse from the cotton mills.

Prof. A. DENDY, Sec.L.S., exhibited lantern-slides and preparations which throw light upon the structure of the Pineal Eye of *Sphenodon*.

The Chairman, Prof. Herdman, and the Rev. T. R. R. Stebbing took part in a short discussion, and Prof. Dendy replied.

The following papers were read :—

1. “On *Fucus spiralis*, Linné, or *Fucus platycarpus*, Thuret.”
By Dr. F. BÜRGESEN. (Communicated by the General Secretary.)

2. "The Economy of *Ichneumon manifestator*, Marsham." By C. MORLEY, F.E.S. (Communicated by E. A. COCKAYNE, F.L.S.)
3. "The Polyzoa of Madeira." By the Rev. Canon NORMAN, M.A., F.R.S., F.L.S.

February 18th, 1909.

Dr. D. H. SCOTT, F.R.S., President, in the Chair : afterwards
Lt.-Col. PRAIN, C.I.E., F.R.S., Vice-President.

The Minutes of the General Meeting of the 4th February, 1909, were read and confirmed.

Miss Helen Stuart Chambers, B.Sc., was admitted a Fellow.

Mr. Alexander James Gibson, Mr. Edward James Salisbury, B.Sc., and Miss Marie Charlotte Carmichael Stopes, D.Sc. (Lond.), Ph.D. (Munich), were proposed as Fellows.

Mr. David Reekie was elected a Fellow.

The President announced that two vacancies existed in the list of Foreign Members, caused by the deaths of Prof. Alfred Giard and Prof. Karl Möbius.

The President then left the Chair, and was succeeded by Lt.-Col. Prain.

A discussion on "Alternation of Generations in Plants" was opened by Dr. WILLIAM H. LANG, M.B., D.Sc. After some introductory remarks and reference to some examples of well-marked alternation of generations, and the nuclear difference between the two generations, the Author adduced the ontogeny of organisms without alternation of generations ; the concept of a specific cell corresponding to each specific form. The concept of the specific cell must be applied to organisms with alternation : the bodies of the two alternating individuals in the life-history may be similar or dissimilar.

Two alternative explanations are open as to the differences between the two generations in the complete life-history :

- (a) that the differences are due to the different state of the specific cell in the spore and zygote respectively ;
- (b) that they are due to different environmental conditions acting on equivalent germ-cells.

The former view, which is often tacitly assumed, meets with difficulties in the more complex explanation of the transmission of characters which it involves; in the similar bodies, in spite of the nuclear difference, of the two generations of *Dictyota*, etc.; in the different bodies with no nuclear difference, in certain abnormal ferns.

The latter view allows of a simpler explanation of the transmission of characters; is consistent with similar bodies being developed from the haploid and diploid germ-cells when exposed to the same conditions, as in *Dictyota*; and with the results of their development being profoundly different, as in archegoniate plants. In the latter the zygote, retained within the body of the gametophyte, is removed from all the influences acting on the spore and exposed to a new set of nutritive and correlative influences proceeding from the enclosing body of the sexual individual. These influences last until a condition of formative induction may fairly be supposed to be established.

The mode of reproduction—sexuality or spore-production—appears to be necessarily associated with the state—haploid or diploid—of the specific cell. In the light of this ontogenetic view of the origin of the difference between the two generations, examples of the Algæ, Hepaticæ, Musci, Lycopodiales, Equisetales, and Filicales were considered as well as the facts regarding apogamy and apospory. Comparisons were suggested between the two generations in the several groups.

The bearing of the ontogenetic view on the antithetic and homologous theories as at present regarded was then considered. While the possibility of the different states of the specific cell in the spore and zygote having some causal influence on the difference of the resulting individuals must be borne in mind, it is suggested that this ontogenetic theory of the nature of the alternation seen in Bryophyta and Pteridophyta may prove a useful working hypothesis, that it will lead to work on new lines, and that it is to some extent open to experimental test.

An animated discussion followed, the speakers being Prof. F. O. Bower, Dr. D. H. Scott, P.L.S., Prof. J. Bretland Farmer, Prof. F. W. Oliver, and Mr. A. G. Tansley, Dr. Lang briefly replying.

March 4th, 1909.

Dr. D. H. Scott, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 18th February, 1909, were read and confirmed.

Mr. Henry Caracciolo, F.E.S., C.M.Z.S., Mr. John Beavis Groom, and Dr. Anstruther Abercrombie Lawson, B.Sc., Ph.D., were proposed as Fellows.

Prof. Yves Delage and Prof. Magnus Gustaf Retzius were proposed as Foreign Members.

Mr. William Ambrose Clarke, Mr. Frank Hicks, and Miss Ida Mary Roper were elected Fellows.

Mr. R. A. ROLFE, A.L.S., exhibited flowers of several crosses derived from the hybrid *Epidendrum kewense* and its parents, which showed Mendelian phenomena.

Dr. A. B. Rendle and Prof. Weiss contributed some remarks, and Mr. Rolfe replied.

Prof. F. E. WEISS exhibited actual specimens of the curious development of the roots of a Sycamore which had grown on very stony soil, and further illustrated the developments by lantern-slides.

Dr. O. Stapf, Mr. J. C. Shenstone, and the President remarked upon the phenomena thus shown.

The following paper was read:—

“A Contribution to the Montane Flora of Fiji, including Cryptogams; with Ecological Notes.” By Miss L. S. GIBBS, F.L.S.

March 18th, 1909.

Dr. D. H. SCOTT, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 4th March, 1909, were read and confirmed.

† Mr. William Herbert Mullens and Mr. Gurney Wilson were admitted Fellows.

Dr. William Henry Lang, M.B., C.M., and Mr. Martin Hubert Foquet Sutton were proposed as Fellows.

Mr. Alexander James Gibson, Mr. Edward James Salisbury, B.Sc., and Miss Marie Charlotte Carmichael Stopes, D.Sc., Ph.D., were severally balloted for and elected Fellows.

Mr. C. E. SALMON, F.L.S., exhibited specimens of *Euphrasia minima* from Somerset, which had been ten years in his herbarium, and remarked upon the geographical range of the species.

Mr. F. N. WILLIAMS contributed further remarks and pointed out the strong probability that *E. minima* was the type of *E. officinalis*, Linn.

The following papers were read :—

1. "The Dry-rot of Potatoes." By Miss SIBYL LONGMAN.
(Communicated by Prof. F. KEEBLE, F.L.S.)
2. "The Structure and Affinities of *Davidia involucrata*, Baill."
By A. S. HORNE, B.Sc. (Communicated by Prof. FARMER,
F.R.S., F.L.S.)

April 1st, 1909.

Dr. D. H. SCOTT, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 18th March, 1909, were read and confirmed.

Miss Mary Rathbone, Mr. James Montagu Francis Drummond, B.A., and Dr. Marie Charlotte Carmichael Stopes, were admitted Fellows.

Mr. Henry Caracciolo, F.E.S., C.M.Z.S., Mr. John Beavis Groom, and Dr. Anstruther Abercrombie Lawson were elected Fellows.

Dr. MARIE STOPES exhibited several microscope slides and micro-photographs of plant petrifications from Japan. The petrifications are of Cretaceous age, and are preserved as masses of fragments in some degree like the palæozoic "Coal-ball." The specimens included a number of new genera and species whose structure throws light on the flora of the Cretaceous period, and in particularly is important in relation to the question of the early Angiosperms. These specimens are the first to be worked on from these beds.

The President congratulated Miss Stopes in the name of the Society, on the successful and important results of her journey and explorations.

Prof. F. W. Oliver and Mr. E. A. Newell Arber joined in the discussion which followed.

Mr. A. D. DARBISHIRE exhibited seven cases of specimens as the results of breeding experiments with Peas, illustrating Mendelian Phenomena; and Mr. ARTHUR SUTTON showed a large series of seeds, some being results obtained by crossing *Pisum arvense* from the neighbourhood of Jaffa in Palestine, with varieties of culinary Peas, *P. sativum*.

Prof. Keeble and Mr. J. R. Drummond contributed further remarks, and the exhibitors replied.

Mr. WALKER showed specimens of Amphipoda preserved for 26 years in pure glycerine, the colour and markings being perfectly retained.

He concluded by offering for acceptance by the Society, a Microscope by E. Leitz of Wetzlar, fitted with three powers and Abbé's condenser.

The President moved a special vote of thanks to the donor for his generous and welcome gift, which was carried by acclamation.

The following papers were read :—

1. "Amphipoda Hyperiidæ of the 'Sealark' Expedition." By A. O. WALKER, F.L.S.
2. "Marine Mollusca of the same Expedition." By Dr. J. COSMO MELVILL, F.L.S.
3. "Mollusca of the Seychelles Archipelago." By E. R. SYKES, F.L.S.
4. "On a Blind Prawn from the Sea of Galilee." By Dr. W. T. CALMAN, F.L.S.

May 6th, 1909.

Dr. D. H. SCOTT, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 1st April, 1909, were read and confirmed.

Mr. Joseph Pearson, M.Sc., Mr. Edward James Salisbury, B.Sc., and Mr. Frank Hicks were admitted Fellows.

Dr. William Henry Lang, M.B., C.M., and Mr. Martin Hubert Foquet Sutton were severally balloted for and elected Fellows; and Professor Yves Delage and Professor Magnus Gustaf Retzius were in like manner elected Foreign Members.

Lady Isabel Mary Peyronnet Browne, Captain Stanley Smyth Flower, Mr. Valavanur Subramania Iyer, M.A., Madras University, Miss Julia Lindley, and Mr. William Robert Price, B.A. Cantab., were proposed as Fellows.

The following Auditors were nominated from the Chair, and by show of hands were duly elected :—For the Council, Sir Frank Crisp and Prof. J. P. Hill. For the Fellows, Mr. G. S. Saunders and Mr. Henry Groves.

Mr. E. A. NEWELL ARBER explained by means of lantern-slides the ecology of two alpine species of *Sempervivum*, namely *S. arach-*

noideum and *S. montanum*; he pointed out the formation of primitive soil by three methods: (1) from crustaceous lichens, (2) mosses, and (3) decay of coniferous needles. Upon this primitive soil these *Semperviva* flourished and formed groups, which might be regarded as individuals or colonies, but for which he preferred the non-committal term of 'pseudo-colony.' The stolons, which were omitted from the rosettes, were sometimes of great length before giving rise to a daughter-rosette.

Dr. Otto Stapf followed with some additional remarks, and the Author replied.

Mr. JAMES BUCKLAND exhibited a series of sixty lantern-slides received from the United States of America, and Australia, in illustration of various species of birds in imminent danger of extinction in consequence of the commercial demand for their plumage as means of adornment. He pointed out the urgency of prohibitive legislation in order to save a multitude of birds, now rare, owing to the reckless slaughter by the plume-hunters.

The first group of slides showed the slaughter of gulls and terns on the Atlantic seaboard of the United States, so great that President Roosevelt had intervened by proclaiming certain portions as reservations, and the resultant saving of the terns in these protected sanctuaries. Next were shown the Snowy Herons on the Florida Keys Reservation; the patrol boats for the enforcement of the protective regulations; the grave of a warden shot in the execution of his duty by a bird-hunter on forbidden territory; and nesting-habits of the Egret in Florida.

Following these came slides of plumage-birds from Oregon, California, and Venezuela: the flightless birds of New Zealand; the Birds of Paradise, Emu, Lyre-bird, various Bower-birds, and home of the Albatross; the Australian Gannet in its rookery, closing with "The cost of a plume," a series of slides showing the effect of the slaughter of the parent birds by the lingering death of the nestlings by starvation; these latter slides had been obtained by climbing with the camera to the top of the Blue Gums, in which the nests were built.

Prof. A. DENDY spoke of the remarkable interest of the exhibition, and trusted that the devotion of Mr. Buckland to the cause he had so much at heart would be crowned with success. He referred to the fact that the Council of the Society had done what it could in the good cause, by supporting the proposed bill for the restriction of the importation of plumage into this country. With regard to the flightless birds of New Zealand: they occupied different ground, as the danger to which they are exposed is chiefly due to the introduction of predatory animals into the Dominion.

The following papers were read :—

1. "On some *Zoanthæ* from Queensland and the New Hebrides."
By Mrs. LEONORA WILSMORE, M.Sc. (Communicated by
Prof. J. P. HILL, D.Sc., F.L.S.)
2. "On two new Genera of Thysanoptera from Venezuela."
By B. S. BAGNALL. (Communicated by Lord AVEBURY,
P.C., F.R.S., F.L.S.)

May 24th, 1909.

Anniversary Meeting.

Dr. D. H. SCOTT, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 6th May, 1909, were read and confirmed.

An enlarged copy by Miss Medland of the miniature of Colonel George Montagu, F.L.S. (1747-1815), one of two executed for Mr. W. H. Mullens, F.L.S., in a contemporaneous frame, was presented by that gentleman, and was accorded a special vote of thanks.

Mr. R. V. SHERRING, F.L.S., placed on the table (*a*) a pure white variety of *Orchis Morio*, and (*b*) the pink orchid from Christchurch meadows, which varies from typical *Orchis incarnata*, Linn., by flowering some weeks earlier.

Miss Ida Mary Roper, Mr. Walter Edward Collinge, Mr. John Beavis Groom, and Mr. Richard Manliffe Barrington, were admitted Fellows.

Mr. William Dennis and Mr. Edward John Woodhouse were proposed as Fellows.

The Treasurer then read his financial statement, which was received and adopted by the Meeting (see p. 18).

A Fellow asked if anything had been received from the estate of the late Herbert Spencer, as noted in newspapers. The General Secretary replied that nothing except a copy of the Will had been received by the Society.

Receipts and Payments of the Linnean Society from May 1st, 1908, to April 30th, 1909.

<i>Receipts.</i>		<i>Payments.</i>	
	£ s. d.		£ s. d.
Balance at Bankers on 1st May, 1908	426 5 5	Taxes and Insurance	10 18 9
Interest on Investments	218 8 1	Repairs and Furniture	97 6 2
Admission Fees	192 0 0	Coals, Electric Current and Gas	53 7 3
Annual Contributions	1620 17 0	Salaries	771 17 6
Compositions	258 0 0	Library:—	
Sales of Publications:—		Books.....	£208 7 0
Transactions.....	£86 5 3	Binding.....	79 18 11
Journals	132 11 5		288 5 11
Proceedings and Catalogues	8 13 10		
Miscellaneous Receipts.....	227 10 6	Expenses of Publications:—	
Donations in aid of Publications	6 13 5	Printing.....	£787 9 2
Received in connection with the D.-W. Celebration ..	292 5 6	Illustrations	463 17 0
	190 9 10	Distribution	88 2 11
			1339 9 1
		Miscellaneous Printing and Stationery	97 15 6
		Petty Expenses (including Tea and Postage).....	126 4 8
		Investment of Compositions	183 14 9
		Expenses in connection with the D.-W. Celebration ..	256 17 5
		Balance at Bankers, 30th April, 1909	206 12 9
			£3432 9 9

Investments on April 30th, 1909.

	£ s. d.		£ s. d.
Metropolitan 3½ per cent.	1079 11 3	@ 103½	1117 6 10
Great Indian Peninsula Railway, Annuity Class B	42 1 5	@ 20½	851 18 8
Forth Bridge Railway 4 per cent. Stock	450 0 0	@ 112	504 0 0
Metropolitan 3 per cent.	1000 0 0	@ 94	940 0 0
India 3 per cent.	750 0 0	@ 89	667 10 0
Eastern Bengal Railway 4 per cent. Debenture Stock	1000 0 0	@ 109	1090 0 0
Great Western Railway 4 per cent. "	1000 0 0	@ 118	1180 0 0
Midland Railway 2½ per cent. Prel. Stock.....	200 0 0	@ 69½	139 0 0
Metropolitan Water Board 3 per cent. Stock "B" (Westwood Bequest)	232 5 0	@ 94	218 6 3
			£6708 1 9

HORACE W. MONCKTON, *Treasurer.*

We have in conjunction with the Professional Auditor, who certifies as to all details) audited the Accounts of the Society for the year ended 30th April, 1909, and found them correct.

ARTHUR DENDY,
HENRY GROVES,
JAMES P. HILL,

} *Auditors.*W. B. KEEN, *Chartered Accountant.*

Mr. J. L. J. BONHOTE asked a question relative to the Darwin-Wallace Fund, which was answered by the Treasurer pointing out that the statement was necessarily compiled from two annual statements, and did not fall entirely under either financial year.

The General Secretary's report of deaths, withdrawals, and elections during the past year was read, as follows :—

Since the last Anniversary Meeting 20 Fellows have died or their deaths been ascertained :

Mr. Lewis A. Bernays.	Mr. Frederick Edward Hulme.
Mr. John Henry Burrage.	Mr. William Saville Kent.
Mr. Cuthbert Collingwood.	Sir George King.
Mr. Hastings Charles Dent.	Mr. William Henry Kirton.
Rt. Honourable Lord Egerton of Tatton.	Mr. Arthur Lister.
Sir John Evans.	Mr. George Nicholson.
Dr. James Fletcher.	Mr. Robert Okell.
Mr. Francis Blackwell Forbes.	Mr. James Robert Reid.
Mr. William J. O. Holmes.	Prof. Harry Govier Seeley.
Mr. Wilfrid Henry Hudleston.	Mr. Alexander Whyte.

ASSOCIATE (1).

Mr. George Sim.

FOREIGN MEMBERS (2).

Prof. Alfred Giard.
Prof. Wilhelm Lilljeborg.

The following 6 Fellows have withdrawn :

Mr. Hugh de Beauvoir de Havilland.	Mr. Edward Francis Johns.
Rev. Thomas W. Fyles.	Mr. Louis Compton Miall.
Mr. Thomas Bennett Goodall.	Mr. David Sharp.

Mr. Graham Ewart Bott, Mr. John Edward Shorec Salvin-Moore, Mr. William Tyson, and Mr. Joseph William Williams have been removed from the List of Fellows, under the provisions of the Bye-Laws, Chapter II. Section 6.

Thirty-eight Fellows (of whom 32 have qualified) and 2 Foreign Members have been elected.

The Librarian's report was then laid before the Meeting as follows :—

During the past year, 119 volumes and 142 pamphlets have been received as Donations from Private individuals.

From the various Universities, Academies, and Scientific Societies, there have been received in exchange and otherwise 308 volumes and 105 detached parts, besides 63 volumes and 13 parts obtained by exchange and donation from the Editors and Proprietors of independent periodicals.

The Council at the recommendation of the Library Committee have sanctioned the purchase of 200 volumes and 78 parts of important works.

The total additions to the Library are therefore 690 volumes, and 338 separate parts.

The number of books bound during the year is as follows :—
In full morocco 8, in half morocco 223 volumes, in half calf 3 volumes, in full cloth 169 volumes, in vellum 21 volumes, in buckram 28 volumes, in boards or half cloth 22 volumes. Relabelled (half morocco, and cloth backs) 59 volumes. Total 533 volumes.

The General Secretary having read the Bye-Laws governing the elections, the President opened the business of the day, and the Fellows present proceeded to vote.

The President then delivered his Annual Address as follows :—

PRESIDENTIAL ADDRESS.

DURING last year and this our thoughts have been specially directed to the great revolution in biology accomplished, 50 years ago, by Darwin and Wallace. Last July we held our own celebration, at which I had the high honour of presiding, of the first inauguration of the theory in the rooms of our Society. The proceedings on that day were of extraordinary interest, owing, above all, to the contributions of Dr. Wallace himself and of Sir Joseph Hooker.

Since then, some of us have taken part in a very charming commemoration at Oxford, of the Centenary of Darwin's birth, and now we are all looking forward to the great Jubilee of the 'Origin of Species' to be celebrated at Cambridge next month. We have already welcomed a harbinger of that important event in the shape of the memorial volume on Darwin and Modern Science. To have been a contributor to this book is a privilege which I value very highly, but it has, like other gratifying things, its drawbacks, which I have felt rather acutely during the preparation of this address. I have thought it natural and appropriate to choose as my subject this year some points in botanical morphology which have a bearing on Darwinian doctrine. But some of the questions on which I should have wished to speak today have already been dealt with in my contribution to the Darwin memorial volume, and I have found the field of my observations somewhat restricted, if the error of repeating oneself was to be avoided. The subject, however, even within the limits of palæobotany (to which I shall not wholly confine myself) is sufficiently wide, and I trust that there is still scope for such remarks as may occupy the short time for which I propose to detain you.

The Darwinian theory of the Origin of Species by Variation and Natural Selection only fulfils its *role*, in so far as the distinctive characters of organisms are, or have been, adaptive, *i. e.* beneficial to the species. Purely "morphological" characters (if any such exist) and non-adaptive characters in general are not explained by the Darwinian theory (or only indirectly with the help of correlation). I therefore make no apology for having a good deal to say about adaptations in what follows. I am aware that in some quarters adaptation is out of fashion just now, as was already the case in Darwin's day. In a well-known passage in a letter to Sir W. Thiselton-Dyer* written in 1880 about adaptations in germinating seeds, Darwin says: "Many of the Germans are very contemptuous about making out use of organs: but they may sneer the souls out of their bodies, and I for one shall think it the most interesting part of natural history."

To save any risk of international complications, it may be well

* 'More Letters of Charles Darwin,' ii. p. 428.

to add that in these days it is not necessary to go to Germany to find people "sneering out their souls" at adaptation! It is a curious habit of mind, but need not be taken too seriously. Such justification as it has, lies in a pardonable reaction against the too facile assumption of hypothetical functions where direct evidence was not available. That the great bulk, if not the whole, of organic structure is of the nature of an adaptive mechanism or device cannot be seriously doubted.

The Origin of Species by means of Natural Selection does not, as has sometimes been imagined, involve a constantly increasing perfection of adaptation throughout the whole course of Evolution. Darwin expressed his belief "that the period during which each species underwent modification, though long as measured by years, was probably short in comparison with that during which it remained without undergoing any change."*

During the long periods of rest, adaptation to the then existing condition of life must have been relatively perfect, for otherwise new variations would have had the advantage and change would have ensued. It thus appears that, as a rule, a state of equilibrium has existed in the relation of organisms to their environment, only disturbed when the conditions were changing. That such long periods of evolutionary stability have actually occurred is shown, for example, not only by the familiar case of the Flora of Egypt, unaltered during a long historic period, but still more strikingly by the absence of any noticeable change in the plants of our own part of Europe since glacial or pre-glacial times.

The conclusion follows that at any given time, apart from the relatively short critical periods when changed conditions had to be met, we must expect to find organisms in a state of complete adaptation to their surroundings. When physical and especially mechanical conditions are in question, such as have practically remained constant through all geological time, we may reckon on finding the corresponding adaptive structures essentially the same at the earliest periods as they are now.

Hence, the attempt to support the Darwinian theory by the detection of imperfect adaptations in Palæozoic plants, is wholly futile, as was well shown by the late Prof. Westermaier in a controversy on this question a few years ago. Westermaier's own point of view was not that of a Darwinian, but, nevertheless, his conviction that efficient adaptation has always been characteristic of living organisms, is a perfectly sound one, thoroughly in harmony both with the principles of Darwin and Wallace, and with the observed facts, as far back at any rate as the palæontological record extends. In particular, Westermaier's contention that the construction of the Carboniferous plants followed the laws of mechanical stability and economy of material, just as is the case in plants of our own day, is completely confirmed by accurate observations on their structure, while his opponent's supposed detection of palæozoic constructions "in direct

* 'Origin of Species,' 6th edition, p. 270.

contradiction to the principles of the engineer" merely showed that the critic had failed to distinguish between the supporting and conducting tissues of the plant. It appears to have been characteristic of Palæozoic plants that their mechanical tissues were, to a great extent, independent of the wood and concentrated in the outer cortex—the most advantageous position on engineering principles. For example, the extremely prevalent "Dictyoxylon" type of cortex, in which bands of strong, fibrous tissue, united to form a network, alternate with the living parenchyma enclosed in their meshes, was an admirable mechanical construction for stems which did not attain any great thickness by secondary growth. Where such growth was so extensive as to put the primary supporting system out of action, we find, as in species of *Sigillaria* and *Lepidodendron*, a secondary Dictyoxylon framework set up in the periderm, and no doubt renewed as further growth went on. The periderm, so typical a feature of the tree-Lycopods of the Palæozoic, was not a mere bark, but constituted the chief mechanical tissue of the older trunks. The wood, only moderately developed, was, as a rule, too centrally placed to afford an efficient resistance to bending strains, and was a comparatively soft, thin-walled tissue, evidently adapted solely or chiefly for conducting purposes.

In the Calamites, we find, in young stems, the same alternation of fibrous and parenchymatous bands in the cortex, which is so familiar to physiological anatomists in the stems of our living Horsetails. In the more mature Calamitean stems we meet with an immense development of periderm, which may have had a mechanical function like that of the *Lepidodendreae*, though in Calamites the wood often had a denser structure, and may have contributed more materially to support.

The great Tree-ferns of the later Carboniferous (if Ferns they were) evidently depended for their mechanical strength on a stereome or supporting tissue quite distinct from the vascular system, and for the most part peripherally disposed, as it should be. Their power of resistance to bending strains was no doubt greatly increased by the dense external envelope of strongly constructed adventitious roots, imbedded in the cortex, a mode of support which we meet with in some Monocotyledons such as *Kingia* (Liliaceæ) and species of *Puya* (Bromeliaceæ) at the present day.

The remarkable Palæozoic genus *Sphenophyllum* shows an only moderately strong construction, and it may be that here the central woody axis was of greater relative value as a support, but from the habit we may be sure that the species were not ordinary upright terrestrial plants, and that the conditions of stability were different from those in the other cases cited. The old view was that *Sphenophyllum* was an aquatic genus; there are, however, many arguments against this, and of late years Prof. Seward's suggestion that the species may have been scrambling climbers, supporting their weak stems by the aid of their more robust neighbours, has found favour and would explain a construction possibly adapted to tensile strains.

When we come to the most highly organised of the Palæozoic plants, the Cordaitales, constituting the characteristic Gymnosperms of that epoch, we find that the young stems had the same "Dictyoxylon" construction of the cortex as was so common among the contemporary fern-like Seed-plants. The Cordaitan wood, however, often assumed a dense structure, and in many cases (as also sometimes occurred among the Pteridosperms) there were tangential bands of narrow fibre-like wood-elements, suggesting, though not identical with, the autumn wood of recent Coniferous trees, and no doubt subserving a special mechanical function.

The exigencies of secondary growth, when occurring on a great scale, ultimately demand that the mechanical tissues should be seated in the wood, on the inner side of the growing zone, though this is not the best position on engineering principles. The old plants were on the whole more correct in their methods; their successors have more often had to adopt a compromise, which sacrifices a certain degree of mechanical efficiency in order to facilitate construction.

In the leaves of the Cordaitæ we meet with remarkably perfect types of mechanical construction showing various applications of the I-girder principle, with utilization of the "web" for the protection of the conducting vascular strands. The construction is on the same lines as that of many of the Monocotyledonous leaves investigated by Schwendener in his classical work. It will be remembered that the Cordaitan leaves were originally classed as those of Monocotyledons, which they closely resemble in form and mechanical requirements. Here there is no secondary growth to disturb the lines of a rational construction; the leaves were of great length and borne on lofty stems, requiring a strong mechanical system for their support, and hence we find that they present admirable illustrations of engineering principles.

Without pursuing the subject further it may be added that other Palæozoic leaves show essentially the same types of mechanical construction as are found in leaves of corresponding shape and dimensions in the living Flora.

These few illustrations may suffice to show that from an engineering point of view, the plants of the Palæozoic were just as well constructed to resist the strains to which their organs were exposed, as are their recent successors. Mechanical construction provides a favourable means of testing the standard of adaption in early fossil plants, for we may assume that in this respect the conditions were essentially the same then as now. In other cases, it is often difficult to estimate the perfection of the mechanism, because we have no sufficiently exact data as to the end which it served; in many cases our knowledge of the working of the machine even in a recent plant is still very imperfect. This is especially true of the water-conducting apparatus in vascular plants, the mode of action of which is still the subject of dispute among physiologists. A few points bearing on the structure of the wood in fossil plants may, however, be mentioned.

Westermaier, in the controversy already mentioned, perhaps went too far when he maintained that histological differentiation was as far advanced in Palæozoic plants as in those of our own day. We have no evidence that the complex structure of the wood characteristic of our Dicotyledonous trees had any close parallel in the Carboniferous Flora. The mechanism was constructed on other lines, but in its own way was elaborate enough. For example, the extraordinary lattice-work structure of the scalariform vessels, recently discovered by Mr. Gwynne-Vaughan, was first suggested to him by observations on the wood of fossil Ferns, belonging to the Osmundaceæ, and goes back to Palæozoic members of that family. The complex mechanism of the wood-elements with bordered pits was peculiarly characteristic of extensive groups of plants in the Palæozoic Flora. The horizontal tracheides in the medullary rays, serving no doubt for the transference of water in a radial direction, now peculiar to the wood of the more highly differentiated Coniferæ, was anticipated by the Palæozoic Lycopods, as was also the remarkable "transfusion-tissue" of the leaf, a system of water-conducting elements serving to reinforce the vascular bundle in the irrigation of the tissues of the leaf, and thus replacing the more complex venation of other types. In the cases last mentioned—the ray-tracheides and the transfusion-tissue—the peculiar differentiations in question were, in my opinion, of quite independent origin in the two groups of plants which have possessed them.

I have elsewhere dwelt on the gradual change in the construction of the wood, correlated with the on-coming of secondary growth, and have traced the slow extinction of the old, "Cryptogamic," centripetally-developed wood, as the newer, centrifugal wood, derived from a cambium, more and more effectually took its place*. In the former we have to do with a structure becoming vestigial, but it is interesting to note how the doomed tissue was not always left in its old age to be a mere pensioner on its more active neighbours, but was often employed, while it survived, on such work as it was still able to do. We find, in quite a number of cases†, that the central wood had changed its character, and shows by its structure that it had become adapted to the storage, rather than the transmission of the water-supply, its earlier function now being more conveniently left to the external parts of the wood. Such utilization of a vestigial structure appears to be a good mark of a high standard of adaptation.

Another interesting case of adaptive specialization in an organ which may be regarded as of an old-fashioned type is to be found in the rootlets of *Stigmaria*. The nature of these appendages has been much disputed—last year we had an interesting discussion on the subject, opened by Prof. Weiss. I have used the word "old-fashioned" because there is some reason to suppose that

* Scott, D. H., "The Old Wood and the New." *New Phytologist*, vol. i. 1902.

† *Megaloxylon*, *Zalesskya*, *Lepidodendron selaginoides*.

these organs were not yet quite sharply differentiated as roots; at any rate there are certain points in which they rather resemble modified leaves, though in my opinion the root-characters predominate. Though they may thus be "primitive," from the point of view of our current morphological categories, these organs, as Prof. Weiss has discovered, show a remarkable adaptive mechanism in the presence of strands of water-conducting elements, running out from the central vascular bundle and terminating in plates of tracheæ placed in the outer cortex. The whole constitutes an absorptive apparatus more elaborate than anything found in recent roots, if we except a few highly specialized haustorial roots of parasites. This example seems to me instructive, for it shows how a very high degree of adaptation may coexist with characters which suggest a somewhat archaic type of organ.

As an example of adaptation to more special conditions, I may instance the xerophytic characters shown by various Carboniferous plants, especially in the structure of their leaves. In the *Lepidodendrea*, the stomata were commonly restricted to two deep furrows on the lower side of the leaf, where they were further sheltered by a growth of hairs. The whole structure of the leaf suggests a xerophilous habit. The late M. Renault regarded the transversely elongated cells of the mesophyll in *Sigillaria* as a means of rolling up the leaf, to diminish transpiration, as occurs, for example, in certain grasses at the present time. In the Pteridosperm *Lyginodendron* the leaflets of the fern-like fronds had a fleshy character, and a conchoid, incurved form; they were provided with a hypoderma, and the endings of the vascular bundles were often dilated, perhaps in connection with glands. These are all characters such as are met with in the plants of salt-water swamps at the present day.

The subject of the physiological anatomy of Palæozoic plants has never yet been attacked in a systematic manner. In a conversation I had with Prof. Haberlandt of Graz, four years ago, he said that he would like to undertake their investigation from this point of view; if he would do so it is certain that a remarkable advance in our conceptions of the adaptive structure of ancient forms would result. Even with our present limited knowledge, however, it is sufficiently clear that the plants of that relatively (but only relatively) early period were thoroughly well adapted to the conditions of their life; succeeding ages brought with them *new* rather than *better* adaptations.

Though there is no question of absolute perfection in Nature, it appears that under given conditions, adaptation is and was sufficiently perfect to make it very difficult to put one's finger on any defect. When we think we can do so it generally turns out that the defect is in the mind of the critic rather than in the organism criticised. We will take a particular case, where the history seems to give some justification for our fault-finding.

The late Palæozoic family Medulloseæ were in some respects the most remarkable plants from an anatomical point of view that

we know of. Most of them were plants of great size, with rather sturdy stems, bearing immense fern-like fronds; the habit altogether must have been something like that of a Tree-fern, but their reproduction was by large seeds, borne on the fronds. To adapt the vascular system of the stem to the supply of the large and compound leaves, the type of structure was assumed which (*pace* Mr. Tansley) it is still convenient to call polystelic, *i. e.* the single vascular cylinder (which may be recognized in some of the earlier members of the group) became broken up, in various ways, into a number of distinct cylinders, only connected at intervals. So far the change was in the same general direction as in the evolution of the higher Ferns; the fossil family, however, was not content with a complex primary vascular system, but must have secondary growth as well. Now if you have a number of vascular columns in the same stem, each growing continuously in thickness on its own account, it is evident that very special arrangements will be necessary to avoid overcrowding. The difficulty was overcome, and the Medulloseæ for some time flourished among the dominant families—the Permian formation represents their Golden age. But one is tempted to think that the system was too complicated to last; at any rate it seems not to have lasted, for these elaborate stems have not been found in any later rocks. Either, as Mr. Worsdell supposes, the Medullosean stem became reduced and simplified to form the Cycadean type of stem of later days, or, as I am more inclined to believe, the family died out altogether. Even here, though we seem to have an instance of a cumbrous mechanism, overreaching itself in elaboration, yet it worked well enough for a time, and it would be difficult to say exactly what the conditions were that led to its being superseded.

One of the most striking results of modern palæobotanical research, led by Williamson, has been to show how widely spread among Palæozoic plants was the power of secondary growth by means of cambium; probably quite as large a proportion of the whole Flora possessed it then, as now. To a certain extent indeed, secondary growth has “gone out” since then, for the very flourishing modern class Monocotyledons have dropped it, and for the most part have done very well without it, though some few have tried to retrace their steps. In spite of this important defection, it is evident that for most land-plants secondary thickening has been a highly successful system, and it is an interesting question whether there was ever a time without it. Was the power of cambial growth, at some period or other however remote, a new acquisition, or is it as old as the vascular tissues themselves? In Palæozoic times every class of land-plant possessed secondary growth in a greater or less degree—Gymnosperms, Pteridosperms, Lycopods, Sphenophylls, Horsetails, and even Ferns, though among true Ferns it seems never to have amounted to very much. Widely spread as it was, the evidence on the whole points to cambial growth having been a secondary acquisition in the history of the race, as in that of the individual

plant. Without going into details, I may say that the argument rests on the relatively great development of the *primary* vascular tissues in many Palæozoic plants, on the frequent sharp distinction between primary and secondary formations, and on the late appearance of the latter in the individual development. The arguments do not apply with equal strength to all groups, and the conclusion may not hold good universally. We know that secondary growth occurs in seaweeds at the present day, and it may quite possibly have existed even among the very earliest land-plants, but in certain phyla it seems to have been a relatively new character, though dating from times before the Devonian. Supposing we could go back far enough, we might find a real deficiency in respect of secondary growth, but its absence would not imply defective adaptation (any more than in Monocotyledons at the present day) for there is a boundless variety in the ways in which plants can equip themselves for the battle of life.

The hypothesis of "a gradual development from the simpler to the more complex" is not borne out by the facts of Palæobotany—the real course of events was infinitely more involved. On a general view, as Darwin himself recognized, "The geological record does not extend far enough back to show with unmistakable clearness that within the known history of the World organisation has largely advanced."* This wise saying has been too often overlooked by those who have tried to popularize Evolution—it is eminently true of the geological history of plants. Though there is no doubt a balance on the side of advance, due chiefly to the increasing complexity of the interrelations among the organisms themselves, the general progress since Palæozoic days is by no means so great as has often been assumed, and we may be sure that as our knowledge of the older plants increases, we shall come to form a still higher estimate than we do now of their adaptive organization.

It has been alleged that it is the fact of the gradual appearance of higher forms which enables us to determine the relative age of strata by their fossils. So far as plants are concerned, this statement is only true to a very limited extent. A fossil Angiosperm, no doubt, would be evidence of an age not earlier than the Cretaceous, but on the other hand a Lycopod of much higher organization than at present, would establish a strong presumption of Palæozoic age; so would the higher forms of the Equisetales; a Cycadophyte with a fructification far more elaborate than that of recent Cycadaceæ would afford sure proof that the bed containing it belonged to the Lower Mesozoic.

Of course much depends on the meaning we give to the words "higher" and "lower." If by "higher" we mean nearer to the recent types, then it is merely a truism to say that the higher forms are characteristic of the later rocks. But if by "higher" we mean more elaborately differentiated, then the statement quoted is, in any general sense, untrue. If again we imply by

* 'Origin of Species,' 6th edition, p. 308.

the word "higher," more perfectly adapted to the existing conditions, then it would be very difficult to prove any advance, for as I have endeavoured to show, adaptation has in every age been fully adequate in relation to the prevailing conditions. If organisms have grown in complexity, it is only where the conditions of their life have become more complex. The most striking examples of high organization in relation to organic environment are presented by the characteristic modern sub-kingdom, the Angiosperms, in the evolution of which, as Saporta pointed out, insect-fertilization has been the chief determining factor, leading to an infinite variety in the special adaptations of the flower and no doubt indirectly affecting the mode of life of the whole plant. The advent of the Angiosperms seems to have been almost simultaneous with that of the higher families of insects, which now, at all events, are chiefly concerned in pollination. It would be difficult to overestimate the importance of these relations in their effect on the Flora of the world. If the vegetation of our own epoch appears, on the whole, definitely more advanced than that of earlier geological periods, this is probably due in a greater degree to the contemporary insect-life than to any other cause.

Unfortunately we have very little knowledge of the *special* adaptations of the plants of the distant past—in particular, we know scarcely anything of their relations to other organisms. The presence of characteristic glands on the surface of some Palæozoic plants (notably the Fern-like seed-plant *Lyginodendron*) has suggested that insects may have been attracted, who were in some way useful to the plant. At the same time the immense number of pollen-grains found in the pollen-chambers of the seed in plants of this group has roused the suspicion that some agent more certain than the wind may have been concerned, and that possibly insect-pollination may have had its beginnings much further back in the evolution of seed-plants than we have been accustomed to think. The suggestion was due to Sir Joseph Hooker, and has received support from evidence recently adduced that living Cycads * and also *Welwitschia* † (plants which belong, in a sense, to the past rather than the present) may employ insects as carriers of pollen. But as regards the fossil plants the data are still insufficient. In any case we must grant the superiority, from this point of view, of the more modern types.

I have discussed the subject of reduction in evolution elsewhere ‡ and will only briefly allude to it here. In many groups (Lycopods, Equisetales, Cycadophytes) there has been a lowering of the standard of organization, partly due to direct reduction, partly to the extinction of the higher forms in each group. There

* Pearson, H. H. W., "Notes on South African Cycads," Trans. South African Phil. Soc. vol. xvi. (1906) p. 348.

† Pearson, H. H. W., "Some Observations on *Welwitschia mirabilis*," Phil. Trans. Royal Soc. (B) vol. 198, 1906, p. 274.

‡ 'Darwin and Modern Science.' XII. The Palæontological Record. II. Plants. 1909.

are, however, many other cases in which the simplification of particular organs means a real advance.

A striking instance is the seed, an organ which required to be much more elaborate in the days of spermatozoid-fertilization, now only lingering in a few archaic survivals from the past (*Cycads* and *Ginkgo*). The seed of an Angiosperm is, generally speaking, a simple affair compared with that of a Pteridosperm or Cordaitan of Palæozoic age. We may add that the stamen of the higher plants is extremely reduced as compared with the male sporophyll of ancient forms such as the Mesozoic Bennettitæ. In such cases (and innumerable other illustrations might be given, especially from the flowers of advanced Angiosperms, where both andræcium and gynæceum tend to a reduction) the reduction is correlated with the more exact adaptation of a specialized floral mechanism.

Taking into account all the causes which make for simplification the question suggests itself whether, when we find a simple type of structure existing at the present day, there is any presumption in favour of its primitive nature. It has sometimes been urged that such a presumption exists (except when direct evidence of reduction can be adduced) on the ground that the general course of evolution must have been from the simpler to the more complex, a rule, as we have seen, subject to so many exceptions, that within the limited period to which the palæontological record extends, it has practically no validity. My own conviction is that in such cases there is no *presumption* of primitiveness at all, and that we should demand very strong evidence before admitting that a given simple structure is primitive. Of course it may happen that a primitive simple type, or at least an old simple type, may have survived to our own day; this may have been the case in decaying families, where the less advanced members have had the best chance of evading the competition of ascendant races. But, on the whole, it is very unlikely that among all the changes and chances of the world's history, a really primitive simplicity should have been preserved. "The eternal ages are long" and there has been time enough for many ups and downs on every line of descent.

The subject of reduction, so essential a clue in any attempt to trace the course of evolution, suggests a reference to the question of the simpler Angiospermous flowers. While the older morphologists were wont to interpret such flowers (*e. g.* those of Aroidæ, Piperacæ, Cupuliferæ) as reductions from more perfect types, there has been a tendency in more recent times to accept the simpler flowers as primitive structures from which more elaborate forms have been evolved. Quite lately, however, a reaction has set in, due to the discovery by Dr. Wieland of the wonderful bisexual flowers of the Mesozoic Cycadophyta, which are constructed on the same plan (though of course with many differences in detail) as the more perfect Angiospermous flowers, such as those of Magnoliacæ. The whole subject was put before the

Society, two years ago, with great fulness and clearness by Messrs. Arber and Parkin, in their paper on the 'Origin of Angiosperms'*. They showed in detail that, if the Angiospermous flower was derived, as they hold, from a source allied to the Bennettiteæ, its evolution, as suggested by Wieland, must have been essentially a process of reduction. I am in general agreement with the views of these authors, and only wish to point out that they are not inconsistent with the great relative antiquity of simple and, *ex hypothesi*, reduced forms, for which in the case of the Amentiferæ there seems to be good geological evidence. Reduction appears to have often been a rapid, indeed a comparatively sudden change as shown by the frequent occurrence of much simplified forms in the same family in which the prevailing structure is typically complete. I need only instance certain Poterieæ among the Rosaceæ, *Senebiera* among the Cruciferae, *Peplis* among the Lythraceæ, *Garrya*, with its catkin-like inflorescence, and perhaps *Davidia* among the Cornaceæ, but similar cases are exceedingly common. It thus appears quite probable that some groups with very simple flowers, though not "primitive" may be very ancient, tracing their origin from forms which in quite early days underwent reduction from the highly developed flowers which probably characterized the first autonomous Angiosperms.

The tentative and somewhat fragmentary observations which I have brought before you this afternoon tend to the following conclusions:—

1. That at all known stages of the past history of plants there has been a thoroughly efficient degree of adaptation to the conditions existing at each period.
2. That, the characters of plants having always been as highly adaptive as they now are, Natural Selection appears to afford the only key to evolution which we at present possess, for all periods covered by the palæontological record.
3. That this record only reveals a relatively short section of the whole evolution of plants, during which, though there has been considerable change, there has not been, on the whole, any very marked advance in organization, except in cases where the conditions have become more complex, as shown especially in the floral adaptations of Angiosperms.
4. That simple forms existing at the present day are, as a rule, of a reduced rather than a primitive nature, but that such reduction may have often set in at a relatively early stage of evolution, and is therefore consistent with a considerable degree of antiquity in the reduced forms.

* Journal of the Linnean Society, Botany, vol. xxxviii. (1907) p. 29.

Mr. WILLIAM FAWCETT moved:—"That the President be thanked for his excellent Address, and that he be requested to allow it to be printed and circulated amongst the Fellows"; which was seconded by Mr. G. S. SAUNDERS, and carried unanimously.

The ballots for Council and Officers having been respectively closed at the times required by the Bye-Laws, the President appointed Mr. J. F. Duthie, the Rev. T. R. R. Stebbing and Mr. F. N. Williams, Scrutineers. The votes having been cast up by them were reported to the President, who declared the result as follows:—

For the Council:—E. A. NEWELL ARBER, M.A.; LEONARD A. BOODLE, Esq.; HENRY BURY, M.A.; Sir FRANK CRISP; Prof. ARTHUR DENDY, D.Sc., F.R.S.; Prof. J. B. FARMER, F.R.S.; Dr. G. HERBERT FOWLER; J. STANLEY GARDINER, F.R.S.; Prof. J. P. HILL, M.A., D.Sc.; JOHN HOPKINSON, F.G.S.; Dr. B. DAYDON JACKSON; HORACE W. MONCKTON, F.G.S.; R. INNES POCKOCK, F.Z.S.; Prof. E. B. POULTON, F.R.S.; Lt.-Col. D. PRAIN, F.R.S.; Dr. A. B. RENDLE, F.R.S.; Miss ETHEL SARGANT; Dr. DUKINFIELD H. SCOTT, F.R.S.; Prof. A. C. SEWARD, F.R.S.; and Dr. OTTO STAFF, F.R.S.; the five retiring Councillors being: Prof. G. C. BOURNE, D.Sc., Prof. W. A. HERDMAN, F.R.S., Prof. F. W. OLIVER, F.R.S., Prof. F. E. WEISS, D.Sc., and Dr. A. SMITH WOODWARD, LL.D., F.R.S.

The President then appointed the same Scrutineers to examine the ballot for the Officers, and the votes having been cast up were reported to the President, who declared the result as follows:—

President: Dr. D. H. SCOTT, M.A., F.R.S.

Treasurer: HORACE W. MONCKTON, F.G.S.

Secretaries: Dr. B. DAYDON JACKSON,
Prof. A. DENDY, F.R.S.,
Dr. O. STAFF, F.R.S.

The PRESIDENT then addressed Prof. F. O. BOWER, F.R.S.:

Professor BOWER,—It is one of the pleasantest incidents of my life that I should be called on at this meeting, the first anniversary at which I have presided, to present to you the Linnean Medal, the greatest distinction which the Society has to bestow, and one associated already with many great names, from that of Sir Joseph Hooker to those of Strasburger and Treub, the last botanical recipients.

You and I have known each other so well and so long that it would be difficult for both of us if I tried to deliver a formal eulogium in your presence. It may be most in accordance with your wishes if I say on this occasion less than I think.

We first met in the early days of your work on *Welwitschia* and *Gnetum* about 1880–1882. Everyone remembers the discovery you made of the true nature of the two persistent leaves in *Welwitschia*, formerly supposed to be the cotyledons. Those

remarkable genera which you taught us so much about are now again to the fore in the minds of botanists.

The next period was occupied with the morphology of the leaf, treated of in an important paper presented to the Royal Society in 1884, in which the idea of the phyllopodium, or leaf-axis, was developed, and in the next year in your work on the apex of the leaf in *Osmunda* and *Todea*, a subject more closely related to your subsequent research. Another early Vascular Cryptogam paper was that on *Phylloglossum*, a good example of a simple form which is apparently not so primitive as we once thought.

Your most important contribution to the publications of our own Society was the great paper on "Apospory and allied Phenomena," suggested by Mr. Druery's observations and read in 1886. This was of extreme interest in itself, and also, as you have yourself told me, from its leading you on to the views of Alternation of Generations which you maintained for so many years.

These views took definite shape in the memoir on "Antithetic as distinguished from Homologous Alternation in Plants," published in 1890. The subject of apospory in particular was further pursued in the papers on *Trichomanes*.

A memoir on "The Comparative Examination of the Meristems of Ferns as a Phylogenetic Study," 1889, was still written under the influence of the old idea that the Leptosporangiate Ferns were the most primitive, but two years later you turned the phylogenetic order upside down, and quite rightly so, when you discussed the question:—Is the Eusporangiate or the Leptosporangiate Type the more primitive in the Ferns? Your new conclusions were in harmony with fossil investigation, and this reminds me of your paper on the axis of *Lepidostrobis Brownii*, 1893, a bye-product of your great sporangial synthesis, but to the palæobotanist a valuable one.

Your Theory of the Strobilus in Archegoniate Plants defined the position which you held with so much determination and resource for the next 15 years—the period of maturity of the antithetic doctrine. I think we both have not unpleasant recollections of the lively and inspiring controversies which marked the adolescence of the theory. Your great series on the Spore-producing members, 1894–1903, affords one of the most striking examples of the inestimable value of a thoroughly thought out working hypothesis (whether ultimately verified or not) as a guide to research.

Leaving many other papers of yours unmentioned I pass on to that admirable book "The Origin of a Land Flora," published last year, in which your long career of morphological research, for the time being, culminated. Since then, to judge from what passed at a memorable meeting of our Society last February, some change has come in your theoretical position, and much as we all respect the openness of mind with which you faced a changed situation,

I cannot help feeling some tinge of regret that the days of our friendly controversies are now, in all probability, past and gone.

Your work as the leader of Morphological botany in this country is worthily recognized by the award of our medal, which I have great pleasure in handing you.

Prof. F. O. BOWER, having received the Medal from the President, replied as follows :—

Mr. President, Ladies and Gentlemen,—It would be impossible for me to receive this token of your kind appreciation of my work without some words of thanks, but they shall be brief. I value your gift of the Medal on three grounds. First, that I receive it from the hands of my old friend, Dr. Scott; and though he and I have differed in the past, on scientific questions (and perhaps even now do not see exactly eye to eye on some of them), still, this has only shown me the truth of what one learned in the Latin Grammar, that "*Amantium iræ amoris integratio est.*" Secondly, I value the gift as a tangible sign of your good will. There have been figures in the scientific world, that like some great colossus have stood independent of contemporary opinion, or definitely opposed to it; but to average men of science the approval of their colleagues acts as a strong incentive to fresh effort, and it is in this way that I receive this award of your medal. Thirdly, I value it because of the distinction of those who have received it before; it is a high honour to have one's name added to a roll which begins with Hooker and Owen, and includes such names as De Candolle, Huxley, Haeckel, and many others. But inclusion in this list seems to stand as a milestone on the road of seniority; for the medal has often been awarded towards the close of an active career. Against this may, however, be set the example of its first recipient, Sir Joseph Hooker, who still in his advanced age is actively at work in the interests of the science he has so long served. This example may well be in itself a fresh stimulus to exertion, and as such I shall hold it to be. I thank you, Sir, and the Society very heartily for the high honour conferred upon me.

The General Secretary then laid the Obituary Notices as follows before the Meeting, and the Proceedings closed.

OBITUARY NOTICES.

LEWIS ADOLPHUS BERNAYS was born in London, 3rd May, 1831, son of the late Prof. A. J. Bernays, the chemist, and was educated at King's College School. He was accustomed to speak of himself as having achieved "a record tenure of the office of Clerk of the Legislative Assembly of Queensland and many years gratuitous service in the cause of economic botany." In 1872 he published "The Olive and its Products, the habits, cultivation, and propa-

gation of the tree" (Brisbane), and eleven years later, "Cultural Industries for Queensland; Papers on useful plants suited to the Climate" (Brisbane). On 17th January, 1871, he was elected Fellow of the Society, and then intending to retire from biological pursuits he withdrew in 1889, but in three years' time he found himself obliged to come forward for re-election, which took place on 15th December, 1892. He died at Brisbane, September 1908. In 1851 he married Mary, daughter of William Borton, of Boddington, Oxfordshire, and had four sons and four daughters issue of the marriage. [B. D. J.]

The death of CUTHBERT COLLINGWOOD on the 20th October, 1908, removes one of our oldest Fellows, his election having taken place on the 1st November, 1853. He was born on Christmas Day, 1826, at Christchurch, Hampshire, and was educated at King's College School, London, and Christ Church, Oxford, graduating B.A. in 1849 and proceeding M.A. in 1852 and M.A. Cantab. (*ad eundem*). He studied Medicine at Edinburgh University, then at Guy's Hospital, London, and added to his experience in Paris and Vienna. His medical qualifications were M.B. Oxford, and M.R.C.P. London. In 1858 he became lecturer on Botany at the Royal Infirmary Medical School, Liverpool, subsequently Physician to the Northern Hospital in that city, and for some years was honorary secretary to the Literary and Philosophical Society, with other official appointments. To the last-named society he contributed two papers on Ornithology dealing with the notes of birds, and their migration, in 1861 and 1862. At the same period he was busied in reporting on dredging marine organisms in the River Mersey, and on the method of advancing science by means of the mercantile marine, to the British Association. Papers on the *Quadrupana*, and the ancient fauna of Lancashire and Cheshire next engaged his attention; but the volume by which Collingwood is best known, is his '*Rambles of a Naturalist on the shores and waters of the China Sea*,' which recounted his observations made in 1866 and 1867 on board H.M. vessels '*Rifleman*' and '*Serpent*,' which appeared in 1868. In the latter year he was elected on the Council of this Society, and went out of office in the following year. He was a fairly constant attendant at our meetings until he removed in 1901 to Paris, where he lived till late in 1907, when he returned to London, and died at Lewisham in his 82nd year. In 1869 he married Clara, daughter of Sir Robert Mowbray. Besides the volume above mentioned our late Fellow published '*A Vision of Creation*,' '*The Bible and the Age*,' and '*From Beyrout to Bethlehem*.'

[B. D. J.]

HASTINGS CHARLES DENT was born on the 23rd June, 1855, at 42 Thurloe Square, the son of Colonel Dent of the Coldstream Guards, his mother being Lady Beaujolois Dent, daughter of the 2nd Earl of Charleville. Educated at private schools, and Owens

College, Manchester, he migrated to the Royal School of Engineering at the Crystal Palace, becoming tutor and then examiner. Following his profession as a civil engineer, he laid down the first tramway in Manchester, and later, spent much time in Brazil, surveying for railways, which gave rise to his 'Two Years in Brazil.' Although he had travelled far and wide, India was unvisited by him. Ultimately about 1888 he settled at Godstone, and there spent much of his time, busied on his collections, those of Lepidoptera and Coleoptera being stated to be exceptionally rich.

He took a chill in the early part of the present year, which developed into bronchitis, and proved fatal on the 6th March, 1909, at The Homestead, Godstone, and was buried at Outwood Parish Church; by a previously expressed wish of the deceased, the coffin was borne on a farm waggon draped in purple.

Mr. Dent was elected Fellow on the 2nd April, 1885, and for many years was also a Fellow of the Entomological Society.

[B. D. J.]

The Right Honourable WILBRAHAM EGERTON was the son of the 1st Baron Egerton of Tatton, born on 17th January, 1832, succeeded as 2nd Baron in 1883, and was created 1st Earl Egerton of Tatton and Viscount Salford in 1897. He was educated at Eton and Oxford, and was M.P. for North Cheshire, 1858-68, and Mid-Cheshire, 1868-83, when his father's death caused his removal to the House of Peers. Attached to agriculture and fond of experiments in that pursuit, he became a Fellow of this Society, 1st December, 1887, but his published works are on other and diverse subjects. He died at Bordighera on the 16th March, 1909; twice married, he left but one daughter, now Lady Albemarle, being succeeded to the Barony by his brother, the Hon. Alan de Tatton; the Earldom and the Viscounty lapsed on the death of the first holder of those titles.

[B. D. J.]

Sir JOHN EVANS, K.C.B., was born at Britwell Court, Burnham, Bucks, on the 17th November, 1823. He was the son of the Rev. Dr. Arthur Benoni Evans, Headmaster of the Grammar School at Market Bosworth. He was educated under his father at Market Bosworth, and then for a short time in Germany. In 1840 at the age of 17 he entered the Paper-making works at Nash Mills, Hemel Hempstead, which had been founded by his mother's brother, John Dickinson, and Nash Mills was his home until nearly the end of his life. In time he became the senior member of the firm, and he was for many years the President of the Paper Makers' Association.

He took an active part in the affairs of the County of Hertford, was High Sheriff in 1881, and for many years was the Chairman of Quarter Sessions and of the County Council.

His connection with the paper-making industry led to a careful

study of matters relating to water-supply, rainfall, and percolation and evaporation. Rain gauges and percolation gauges had been installed at Nash Mills by his uncle, John Dickinson, and for a long series of years they were under the personal supervision of Sir John Evans. Water-supply led naturally to practical geology, and in that field Evans was a leading authority, but it was from his studies in what may be termed antiquarian geology that he was best known to the general public and to geologists both at home and abroad. It was largely owing to the work of Evans in conjunction with Sir Joseph Prestwich, that the great age of the implements found in the terraces of River Gravel of the Somme and the Thames was satisfactorily established.

The collection and study of coins attracted Evans's enthusiastic attention from early days, and in the end he was one of the leading numismatists of Europe.

Sir John Evans was elected into the Royal Society in 1864. In 1878 he became the Treasurer and he held that important post for twenty years. In 1884, when Huxley, who was President, was away ill, Evans prepared and delivered the Anniversary Address. He constantly held office in the Geological Society and was President in 1874-76. In 1880 he received the Lyell Medal, and the Prestwich Medal was presented to Lady Evans last February *in memoriam*.

Evans was at different times President of the Society of Antiquaries, the Royal Numismatic Society, the British Association, and of many other societies. He was made K.C.B. in 1892.

He was the author of 'The Ancient Stone Implements, Weapons, and Ornaments of Great Britain,' which first appeared in 1872, and a second edition in 1897; 'Ancient Bronze Implements, Weapons, and Ornaments of Great Britain and Ireland,' 1881; 'The Coins of the Ancient Britons,' 1864; and of numerous papers which appeared in different serial publications.

Sir John Evans was married three times. His first wife was a daughter of his uncle, John Dickinson, and at her death she left three sons and two daughters. One of the sons is the well-known explorer of Knossos and a Fellow of the Royal Society. The second wife, a daughter of Mr. Joseph Phelps, left no children. Lady Evans, who survives her husband, is the daughter of Mr. Charles C. Lathbury and has a daughter. Lady Evans is an accomplished classical scholar and antiquary.

Sir John Evans was elected a Fellow of the Linnean Society on March 21st, 1878, and died at his residence, Britwell, Hertfordshire, on May 31st, 1908. [H. W. MONCKTON.]

Dr. JAMES FLETCHER was born at Ash, seven miles S.W. from Gravesend, Kent, on 28th March, 1852, was educated at King's School, Rochester, and went to Canada in 1874 as a clerk in the Bank of British North America. After two years of this work he became Assistant in the Library of Parliament, Ottawa, and

devoted all his spare time to Botany and Entomology, which led to his appointment as Honorary Dominion Entomologist and Botanist, followed soon afterwards by work in these departments at the newly-established Central Experimental Farm in 1887. For 21 years he was assistant to Dr. W. Saunders, C.M.G., Director of the Farm.

In 1878 he became a Councillor of the Entomological Society of Ontario, and continued to hold office, being President 1886-88, and again in 1906 to the time of his death. His first paper was on Canadian Buprestidæ in 1878, and his contributions to science were thenceforward frequent and valuable. In 1879 he helped to found the Ottawa Field Naturalists' Club, the most successful of the kind in the Dominion, and later on he succeeded in founding the Association of Economic Entomologists of North America, of which he was President in 1892; he was also one of the original Fellows of the Entomological Society of America. On the 3rd June, 1886, he was elected Fellow of our Society, and in 1896 received the honorary degree of LL.D. from Queen's University, Kingston, Ontario.

From 1885 he had been a Fellow of the Royal Society of Canada, had been President of the Biological and Geological Section, Hon. Treasurer, and, for the last two years of his life, Hon. Secretary, and several most suggestive papers from his pen were published in its Transactions. Other valuable memoirs were his annual reports on the work of his department, and in other serials. Two years ago he issued a work on the weeds which trouble farmers throughout the Dominion, in 4to, with 46 coloured plates. He was much in demand as a lecturer, and was especially successful in securing and holding the attention of his audiences. In this way his influence has been widely felt in arousing people to the best methods of dealing with insect pests.

For many months his health had been failing, and more or less internal hæmorrhage had troubled him, but did not awake alarm. In the autumn of last year he was busy with preparation for the Annual Meeting of the Entomological Society of Canada, to be held at Guelph, Ontario, but the week before the gathering he went to consult a specialist at Montreal. He was at once sent to the Royal Victoria Hospital, and a week later underwent an operation for internal tumour, but failed to rally from it, and died the following morning, Sunday, 8th November, 1908, aged 56.

The writer is indebted to an appreciative obituary by Prof. C. J. S. Bethune in the 'Canadian Naturalist,' xl. 1908, for the foregoing account, where also will be found a portrait of our deceased Fellow. [B. D. J.]

FRANCIS BLACKWELL FORBES, whose death was announced in the 'Daily Telegraph' of November 20 last year, was an American.

In 1857 he went out to China as attaché to Mr. Reed, the Plenipotentiary of the United States of North America, but soon

entered a commercial career, living in Canton in 1858 and 1859 and afterwards in Shanghai. He took much interest in the affairs of the Shanghai branch of the Royal Asiatic Society, whose President he was in 1874. It was then that he made the acquaintance of Mr. Charles Ford—at that time Superintendent of the Botanical Garden at Hong-Kong—which led to his taking up collecting plants more seriously. His first collection was determined during his stay in Europe in 1875 and 1876 by W. B. Hemsley. Then followed a second residence in Shanghai, which lasted from 1877 to 1882. During the five years from 1882 to 1886 he settled in England, applying himself to botanical work at Kew and the British Museum. Subsequently he lived in Paris, and finally he retired to Boston, Mass., where he died.

The name of Francis Blackwell Forbes will always be associated with the exploration of the Flora of China as the promoter of that fundamental work, the "Enumeration of all the Plants known from China Proper, Formosa, Hainan, Corea, &c.," published under the joint names of F. B. Forbes and W. B. Hemsley in the 'Journal' of the Linnean Society, Botany (vols. xxiii., 1886-1888; xxvi., 1889-1902; xxxvi., 1903-1905). The history of this work is given in Bretschneider's 'History of European Botanical Discoveries in China,' p. 722, and in the preface by Sir W. Thiselton-Dyer to vol. xxxvi. of the Journal of the Linnean Society. In this place it will be sufficient to define the share which F. B. Forbes had in the matter. Forbes had already during his first stay in England conceived the idea of a catalogue of all the Chinese specimens found in the herbaria at Kew and the British Museum, as a help towards the botanical exploration of China. This catalogue, a mere list of names, was drawn up by Mr. Hemsley in 1876, and was intended to form the basis for a complete list of the plants known from China after the model of Maximowicz's 'Index Floræ Pekinensis.' After his return from China in 1882, Forbes set to work collecting material for this list, when in December 1883, Mr. (now Sir) W. Thiselton-Dyer made an appeal to the Government Grant Committee of the Royal Society to the effect that a committee be appointed to report on our present knowledge of the 'Flora of China,' stating at the same time that it was desirable to catalogue the Chinese material in the National Herbaria after the manner of the Botany of Godman and Salvin's 'Biologia Centrali-Americana.' The application was acceded to, and a committee appointed which was joined by Forbes in February 1884. He most liberally placed at its disposal his very full slip reference catalogue to records of Chinese plants, collection and notes. At the same time Mr. Hemsley was engaged to co-operate in the "Enumeration," which was to be published in the 'Journal' of the Linnean Society. Private engagements, however, prevented Forbes from taking any further active part in the preparation of the work, which in its execution must therefore be wholly credited to

Mr. Hemsley and, so far as the later orders are concerned, his co-operators.

F. B. Forbes's association with the Linnean Society dates back to 2nd December, 1875, and he served on its Council from 1885 to 1887. He was for a long time Swedish and Norwegian Consul-General at Shanghai, and in consideration of his services was made a Knight Commander of the Swedish Royal Order of Wasa.

[O. S.]

ALFRED GIARD was born in the year 1846. After passing through the École normale supérieure, in 1871 he became assistant to Lacaze-Duthiers, whence he went to Lille as assistant-professor in 1873. As early as 1869 he had in conjunction with Max Cornu printed in the 'Bulletin de la Société Botanique de France' a paper on the hermaphroditism of *Melandryum album* infested with *Ustilago antherarum*, a phenomenon which under the term "castration parasitaire" interested him throughout life.

From Lille in 1888 he was called to Paris to lecture in the Faculté des Sciences, and in 1892 he became titular professor at the Sorbonne, and in 1900 chosen into the Académie des Sciences.

In the 'Bulletin Scientifique de France,' a serial of which he was editor from 1878, in vol. 42, pp. xlv-lxxiii, is given a list of 624 papers published by Giard, to 1908 the year of his death, exclusive of many articles in the 'Grande Encyclopédie' and the 'Botanisches Centralblatt.' He himself in his 'Exposé des titres et travaux scientifiques,' 1896, grouped his various memoirs under twelve subject headings, but embryology and parasitism were his favourite subjects, though, far from confining his attention to them, he took in a wide extent of study. The zoological station of Wimereux, near Boulogne, was established by him in 1874, and his chief pleasure was to settle down in those quarters for such periods as his professorial duties in Paris permitted, busy on material obtained from the sea within a few yards of his study.

He was one of the French delegates at Uppsala and Stockholm at the Linnean festivities in May 1907, with Madame Giard, a lady of English birth. Early in 1908 he wrote accepting the invitation of our Council to the Darwin-Wallace Celebration, but before that took place, a stroke of apoplexy disabled him, and though he partially recovered his powers, a second stroke was quickly fatal: he died in August, 1908. He was elected a Foreign Member on the 1st May, 1902.

He is described as possessing a rare and attractive personality, which attached his pupils strongly to him, and roused their enthusiasm. Yet he could write, "Pour ma part, dans ma carrière déjà longue du professorat, je ne crois pas avoir formé un seul naturaliste"; this is possibly explained by his high ideal of what a fully equipped naturalist should be.

[B. D. J.]

WILFRID HUDLESTON HUDLESTON was born at York on June 2nd, 1828. He was the son of a physician, Dr. John Simpson of Knaresborough, whose wife was through her mother an heiress and a representative of the family of Hudleston of Hutton John in Cumberland. In 1867 Dr. Simpson and his two sons, by letters patent, assumed the name of Hudleston. Wilfrid was educated at St. Peter's School, York, at Uppingham, and St. John's College, Cambridge, and in 1853 he was called to the Bar but does not seem to have practised.

After leaving Cambridge his attention was directed to ornithology, and in pursuance of the study he made in 1855 several journeys in different parts of Europe and in Northern Africa.

In his last term at Cambridge he had attended Sedgwick's lectures, and in 1862 he began a systematic study of natural science, firstly at Edinburgh and afterwards at the Royal College of Chemistry in Oxford Street. He thus acquired a good knowledge of chemistry which was very useful to him in his subsequent geological work. He appears to have definitely devoted himself to geology about the year 1866, when he made the acquaintance of John Morris, and he became a Fellow of the Geological Society in 1867.

He was elected a Fellow of our Society on November 7th, 1878, but did not contribute anything to our publications.

Hudleston was President of the Geologists' Association, 1881-83. He became a Fellow of the Royal Society in 1884, was President of the Geological Society in 1892-94, and of the Geological Section of the British Association at Bristol in 1898. For many years he was one of the Editors of the 'Geological Magazine.' He received the Wollaston Medal of the Geological Society in 1897.

In 1890 Mr. Hudleston married Rose, second daughter of William Heywood Benson, of Little Thorpe, Ripon, who survives him. They lived at 8 Stanhope Gardens, South Kensington, and at West Holme, a property which he purchased between Wareham and Lulworth in Dorsetshire. His Geological and Ornithological collections were housed at Stanhope Gardens, and his Museum was visited by the Geologists' Association on March 11th, 1899.

Hudleston's most important work was the Monograph on the Inferior Oolite Gasteropoda, published by the Palæontographical Society. He contributed numerous papers to various scientific societies and to the 'Geological Magazine.'

Hudleston was a man of great energy, a good shot and fond of fishing, and retained his activity to the last. He died suddenly at West Holme from heart failure on January 29th, 1909.

[H. W. MONCKTON.]

FREDERICK EDWARD HULME was born at Hanley in Staffordshire in 1841, and became a prolific author in many departments, some of which did not arise out of his position at King's College, London, as professor of drawing, but from his wide range of

sympathy. His first publication was 'Plant Form' in 1868, followed in succession by 'Plants, their natural growth and ornamental treatment,' 1874, in which plant-form was utilised as the basis of architectural ornament; 'Familiar Wild Flowers,' by far his most popular production, issued in 8 volumes of coloured plates and letterpress, from 1878-1905, and a ninth volume was in press at his death; 'Suggestions in Floral Design,' 1880; 'Wild Fruits of the Country-side,' 1902; 'Butterflies and Moths of the Country-side,' 1903; 'Wild Flowers in their Seasons,' 1907; and his latest, 'Familiar Swiss Flowers,' 1908. In addition to these his pen produced many volumes on Art, Myths, Archæology and Proverbs, also a history of the town and college of Marlborough.

He was elected Fellow of our Society 18th March, 1869, and was also a Fellow of the Society of Antiquaries. He died at his residence at Kew on 10th April, 1909, and was buried on the 14th of that month. [B. D. J.]

WILLIAM SAVILLE KENT was elected a Fellow on the 19th June, 1873, and he died on 11th October, 1908, from heart failure after an operation. In 1885 he became Inspector of Fisheries at Hobart, Tasmania, till about 1891, and soon afterwards he returned to England, finally settling at Lymington, where he died.

His chief work is the sumptuous volume on the 'Great Barrier Reef of Australia,' with its remarkable illustrations and accurate information about this vast extent of coral-formation. He also gave much attention to oysters and oyster-fishing, and urged the establishment of a biological station on Thursday Island, a central dépôt in the Torres Straits for pearl fishery. He claimed also the power of inducing pearl-oysters to produce fine pearls, by a special treatment.

On 21st June, 1906, he exhibited at one of our meetings a striking series of photographs, in three-colour transparencies and lantern-slides, of the fishes and other fauna of the Polynesian Coral Reefs. [B. D. J.]

Sir GEORGE KING, who died at San Remo on February 12th, was born at Peterhead, Aberdeenshire, on April 12th, 1840. He was educated at the Grammar School at Aberdeen and studied Medicine in the University of the same city, graduating as M.B. with highest academic honours in 1865. His association with Professor G. Dickie, the algologist, first as his pupil and subsequently as his assistant, early engendered in him the desire for a botanical career. The Indian Medical Service, which after some interruption had then just been opened again to young medical men, promised fair prospects for the gratification of his wishes. He entered it therefore as soon as he had taken his degree. After the usual preliminary course at Netley, King was selected for the Bengal Presidency. He reached Calcutta in March, 1866. After a short service at the General Hospital and later at the Medical College

Hospital, he was sent to Central India and Rajputana, where he began field work as a botanist and zoologist as far as was compatible with his medical duties. His botanical inclinations and knowledge soon singled him out for the career which he had at heart. In 1868 he was temporarily entrusted with the administration of the Botanic Garden at Saharanpur, and subsequently entered the Indian Forest Service in the North-West Provinces (now United Provinces), with his headquarters at Dehra Dun. His stay there was not of long duration, as in 1871 he was appointed successor to Dr. Thomas Anderson in the superintendentship of the Royal Botanic Gardens at Calcutta and of Cinchona Cultivation in Bengal, taking over at the same time the duties of a Professor of Botany at the Medical College in Calcutta. To these duties were added in 1891 those of Director of the Botanical Survey of India, a new post just then created. King continued to hold all these offices until, in 1895, he retired from the Professorship in the Medical College of Bengal. This exhausted, however, by no means the sphere of his amazing activity, as he also served on the Committee of the Management of the Zoological Garden at Calcutta, on the Board of Visitors of the Engineering College of Bengal, as a Trustee (and for some time Chairman) of the Indian Museum, and since 1894 as President of the Central Committee appointed by Government to investigate the indigenous drugs of India. He retired in 1905. A severe illness during the last year of his stay in India greatly impaired his health, and after his return to England he found himself from year to year more and more obliged to abstain from work and to seek the protection of the sunny shores of the Riviera, where he suddenly succumbed to a severe attack of his illness.

It is difficult not to underrate the many-sided activity of this botanist, administrator and organiser, who will always stand in the front rank among those who have helped to open the treasure-house of the plant world of India. The long list of his publications, in No. 4 of the Kew Bulletin for 1909, gives, although running over three and a half pages, after all only an inadequate idea of it. Chronologically arranged, it begins with two zoological papers, one on the lion of Aboo, the other on the birds of the Goona District (Central Provinces), both published in 1868. Although kept within a narrow compass they are models of singularly unpretending and yet lucid and to-the-point diction, and all betray acute power of observation. Of a similar character is his first botanical paper, "Notes on the Famine Foods of Marwar," published in the following year; but here we have in addition to the merits mentioned the display of a great talent for coordinating facts and the application of their bearing on problems of practical life. His publications during the next six or seven years when he moved to Saharanpur and Dehra Dun, and finally to Calcutta, reflect the same practical sense and the elasticity with which he knew to subordinate his personal inclinations to the exigencies of

his office. The renovation of the Botanic Garden at Calcutta, which had been wrecked by the two great cyclones of 1864 and 1867, and which now under King rose to new beauty and to greater importance than it ever had, and the successful management of the Cinchona department, which in its ultimate effects became a blessing for the whole of the Indian Empire and even beyond its boundaries, were triumphs of organisation. Both tasks taxed his time heavily; but when they were fairly accomplished, the opportunity had come for work which must have been all the time very near to his heart. A number of short papers on species of *Ficus* published in 1886 and 1887 were the forerunners of the magnificent monograph of the *Ficus* of the Indo-Malayan and Chinese countries, with which in 1888 he initiated that splendid and sumptuously illustrated serial the 'Annals of the Royal Botanic Garden, Calcutta.' Other memoirs on the Indian *Artocarpus*, *Quercus*, *Castanopsis*, Magnoliaceæ, *Myristica*, Anonaceæ, on new and rare Indian plants and the Orchids of the Sikkim Himalaya, some of them in collaboration with other authors, followed, the illustrations filling near on 1300 plates. Shortly after the appearance of the first volume of the Calcutta 'Annals' King started the "Materials for a Flora of the Malayan Peninsula," to be published at intervals in the 'Journal' of the Asiatic Society of Bengal. Under the disguise of a modest title the "Materials" is actually what otherwise would be called a "Flora" of the Malayan Peninsula, that is a systematic catalogue with full descriptions of all the species known from that rich and interesting area. He was not allowed to finish the task. At the time of his retirement the publication had proceeded to the middle of the Calycifloræ. After his return to Europe he continued the work as far as his health would permit, and thus finished Calycifloræ practically unaided by others. From 1902 onwards, however, he made arrangements for collaboration with Mr. J. S. Gamble for the Corollifloræ, while the Monocotyledoneæ were taken over by Mr. Ridley. The magnitude of the task is apparent from the fact that King alone is responsible for the enumeration and description of over 1660 species. The enormous progress of our knowledge of the flora of the Malayan Peninsula would not have been possible but for the fact that King was not satisfied with the old collections in the Calcutta Herbarium and chance contributions, but had paid collectors in the Peninsula, such as Kunstler and Scortechini, whose memory he perpetuated in his ever generous way by dedicating to them a very great number of new species. His system of organised collecting, however, was not confined to the Malayan Peninsula. Almost from the beginning of his administration of the Calcutta Garden, he provided for the sending out of trained native collectors into such districts as appeared to him most promising; and when in 1891 the office of the Botanical Survey of India was established and placed under his directorship, he seized at the idea of so coordinating the efforts of the botanical

officers in the exploration of India that as little waste as possible should occur. The material amassed in the Calcutta Herbarium during his administration is enormous. Neither he himself nor his staff, which in number was always very limited, could ever have elaborated them. If, nevertheless, so much of it has become in a sense the property of botanical science, it is entirely due to the high-minded conception which he had of his office as custodian of the Calcutta collections, and which allowed him to throw them open with unstinted liberality to the workers in the home country as well as abroad. The gain derived therefrom for science is nowhere more evident than in the last volumes of the 'Flora of British India.'

King's association with the Linnean Society dates back to 1870, when he was elected a Fellow. The nature of his work and his official position led naturally to the concentration of his publications in one or the other of the great Calcutta serials, and his contributions to the volumes of the Linnean Society were therefore few and brief, his "Observations on the genus *Ficus*, with special references to the Indo-Malayan and Chinese species" (Journal, vol. xxiv. 1887, pp. 27-44) being the most important of them. Nevertheless, the Society felt great pride in awarding to its illustrious Fellow the Linnean Medal in 1901. He was elected a Fellow of the Royal Society in 1887, and associated as an Honorary Member with various learned Societies at home and abroad.

King was a man of one cast. If he was faithful to his office, he was faithful to his friends. If he was above official narrowness, so often the result of routine, he was equally above the petty conceptions of private life. Liberal, generous and gentle almost to a fault, he conquered wherever he came by the irresistible charm of his personality. [O. S.]

WILHELM LILLJEBORG, Emeritus Professor of Zoology at Uppsala University, and Foreign Member of the Linnean Society since 5th May, 1870, was born in the province of Skåne, on the 6th October, 1816. He studied at Lund under Sven Nilsson, and travelled for scientific ends in Norway, Northern Russia and Finland, the last two countries in 1848, of which he brought out a report in the Stockholm 'Handlingar' in 1850. Hitherto from 1843, the date of his first paper, he had ranged over a wide field, writing on mammals, birds, fishes and mollusca, but he now evinced a strong predilection for the group of Entomostraca, at that time hardly studied in Sweden. In 1853 he issued an octavo volume of more than 200 pages on the Cladocera, Ostracoda, and Copepoda of Scandinavia; at this time he became Assistant Professor at Lund.

Göran Wahlenberg died in 1851, the last Professor of Natural History at Uppsala in the Faculty of Medicine. His chair was

partitioned into several, three of which, Zoology, Botany, and Geology, were assigned to the Faculty of Philosophy.

The first occupant of the Chair of Zoology was Lilljeborg, who entered upon his duties 7th January, 1854, and held it until his retirement in 1882. After three courses of general Zoology, he adopted a syllabus of ten courses, embracing the whole of the animal kingdom, beginning with the Protozoa. His lectures were followed by demonstrations of the types of the groups under consideration. His last course in 1882 was devoted to comparative osteology, and took in all the groups of Vertebrata.

During his professorship he was able to restore or rather to establish the Zoological Museum at Uppsala. Before he came, there were large collections from Thunberg's time onwards, but they consisted mostly of badly preserved and faded mammals and birds, a few insects, dried crustacea, shells, and corals from all parts of the world, without information or localities. The collection of skeletons was practically absent, and the spirit collection was insignificant. They were removed to the Gustavian building, and completely overhauled, and in the course of time a creditable collection was amassed and adequately shown. The zoological laboratory was established in 1875 at Uppsala, the professor fully recognising the importance of practical work.

Upon quitting the chair, Lilljeborg continued his scientific work, and in 1896 a handsome quarto volume *Festschrift* appeared, entitled 'Zoologiska Studier,' in honour of his 80th birthday; one of the articles in this is a bibliography of Lilljeborg's works, numbering 68. After that year he produced 5 later memoirs, upon his favourite group, making a total of 73 papers. He was continually adding to the University collections till his death, which took place 24th July, 1908, and after that event his widow presented to the Zoological Museum, according to an expressed wish of the late professor, books and papers which were not in the library of that institution, numbering about 1400 besides serials.

His professorship was characterised by his keenness in his examinations and enthusiasm for his work, but only once did he quit Scandinavia for a visit to the zoological institutions in London and Paris, and that was in 1865; but he constantly visited the various parts of Sweden, chiefly bent on adding to his collection of Entomostraca. His health remained good till the middle of July last year, and he passed quietly away on the 24th of that month, in the 92nd year of his age.

The data for the foregoing sketch have been drawn from the obituary by Prof. Tullberg, Lilljeborg's successor, published in 'Fauna och Flora,' 1908. [B. D. J.]

ARTHUR LISTER, F.R.S.—Arthur Lister was born at Upton House, West Ham, in 1830 as the youngest son of Joseph Jackson Lister, F.R.S., the distinguished optician. He was educated at Hitchin. At the age of sixteen he began his business career, living at first

in Bedfordshire, then at Bradford, and since 1857 at Leytonstone, near London. Having with two of his brothers bought 'High-cliff' at Lyme Regis in 1871, he spent much of his time there, especially after his retirement from business in 1888. Here he also died somewhat suddenly on July 19th of the present year. When Arthur Lister became known as a botanist he was already well advanced in years, and his first publication was a short note in the 'Journal of Botany' for 1877: "How to preserve the Spores of Agaricini and Polyporei." He had, however, been an ardent lover of nature from childhood and a zealous collector and observer for many years, and was of course perfectly familiar with the microscope and its technique. This fitted him eminently for the work for which he specialised so late in life, and which he pursued with signal success—the study of the Mycetoza. His first contribution to this fascinating class of organisms was published (in collaboration with his daughter) in 1888, and others, to the number of 35, followed, the last appearing a few weeks before his death. His great work, however, was his Monograph of the Mycetoza, published by the British Museum in 1894. Although professing to be a descriptive catalogue of the species in the Herbarium of the British Museum, it is in reality a complete compendium of all the Mycetoza known up to 1894, amply illustrated by numerous woodcuts and 78 plates—photographic reproductions of very beautiful coloured drawings by himself and his daughter Gulielma.

Arthur Lister became a Fellow of the Linnean Society in 1873, and of the Royal Society in 1898. He was also for many years a member of the Essex and Dorset Field Clubs, and of the Mycological Society, as whose President he acted in 1906-07. He was a Justice of the Peace, and in many ways, but always unobtrusively, gave evidence of his public spirit. He belonged to the Society of Friends. Those who had the good fortune of knowing him intimately, remember him as a delightful companion and a most lovable man.

[O. S.]

Professor KARL AUGUST MÖBIUS, who died in Berlin on the 26th April, 1908, was born at Eilenburg, in Prussian Saxony, in 1825, and was originally trained for a school-teacher, but his enthusiasm was awakened by reading the works of Alexander von Humboldt, and he set out for Berlin with very slender means. By giving lessons, he succeeded in getting a university training, and amongst his teachers may be mentioned C. G. Ehrenberg and Johannes Mueller. Becoming assistant to Lichtenstein, he was aided in 1853 to a teaching appointment at Hamburg, where he found time to prosecute his faunistic studies. In 1868 he went to Kiel as Professor of Zoology, and in conjunction with H. A. Meyer he produced the two folio volumes of the 'Fauna der Kieler-Bucht.' Leipzig, 1865-72, a rich storehouse of observations. He had already established a salt-water aquarium, and the famous

Zoological Garden at Hamburg was helped by him at its foundation. The year 1880 witnessed the completion of the Zoological Museum and Institute at Kiel, in great measure due to the strong efforts of Möbius. In 1887 he was called to Berlin as Director of the new Zoological Museum, which he held till the close of 1905, retiring at the age of 80; and on his 80th birthday was published a Festschrift in his honour from his many pupils. The various publications to which his name is attached show his wide range, from Alcyonarians to fishes, and the 'Artbegriffe'; but his chosen field was amongst marine organisms, particularly Mollusca. He had a strong practical sense, and was therefore able to make many useful suggestions in connection with fisheries and other marine industries.

His connection with our Society dated from the 5th May, 1892, when he was elected a Foreign Member. [B. D. J.]

GEORGE NICHOLSON was born at Ripon, Yorkshire, on December 4th, 1847, as the son of a nurseryman. After having received the usual general education, he worked for several years in various nurseries in England, and afterwards in the La Muette Gardens in Paris. In 1873, not long after his return to England, he entered the Civil Service as Clerk to the Curator of the Royal Gardens, Kew; and in 1886, on the retirement of the then Curator, John Smith the second, he succeeded him in that office, holding the post until 1901, when failing health obliged him to retire. He resided for the remainder of his life in Richmond, Surrey, where he died on September 20th, 1908. He was entirely a selfmade man. Although the love for plants and gardening may have run in his veins, a particularly keen intellect making much easy to him that would have been a stumbling-block to others, the success of his life was after all greatly due to the adroit and persistent application of his gifts to a well-defined field of activity. The trend towards concentration and persistence is curiously reflected by the fact that his first publication was on the Wild Flora of Kew Gardens and Pleasure Grounds (1875); whilst almost his last visits to the Gardens—a few weeks before his death and in a bath-chair—were brightened and enlivened to him by the search for minute Lepidoptera and Fungi, which should serve as further contributions to the Wild Fauna and Flora of the Gardens, the exploration of which he had always had at heart. If this was rather in the nature of a hobby, his more serious work shows the same traits. Officially special stress has been laid on his long-continued devotion to the development of the Kew Arboretum, one of the finest collections of this kind; whilst his 'Dictionary of Gardening' (1884-88 in four volumes, and in a French edition, 1892-99) soon became a standard work of gardening. He was also a fertile and serious contributor to the horticultural papers. The Linnean Society recognised his

services to botanical science by electing him an Associate in 1886, which distinction he held until 1898, when he became a Fellow. He was one of the first recipients of the Victoria Medal of Honour in Horticulture (1897), and received the Veitch Medal in 1894.

His travels—he frequently visited the continent, particularly France and Switzerland, and went twice to America—and his wide reading gave his views of men and matters breadth and depth, whilst an exquisitely amiable disposition added much charm to his personality and won him friends wherever he went.

[O. S.]

Professor HARRY GOVIER SEELEY, F.R.S., who died on January 8th, 1909, had been a Fellow of the Linnean Society since 1871. He was born in London on February 18th, 1839, and began early to take an interest in scientific work. He soon inclined towards palæontology and geology, and became assistant to Prof. Adam Sedgwick in the Woodwardian Museum, Cambridge. While here engaged in arranging the collection of fossils and in practical field-work with students, Seeley published many important papers on fossils, especially on fossil reptiles, on which he became an acknowledged authority. His well-known small volume on 'The Ornithosauria' was published by the Cambridge University Press in 1870; and his mature views on the same subject were summarised so recently as 1901 in his 'Dragons of the Air: an Account of Extinct Flying Reptiles.' In 1873 Seeley returned to London, and began to contribute a long series of papers, chiefly on fossil reptiles, to the 'Quarterly Journal of the Geological Society.' In 1876 he published papers on "Resemblances between the Bones of typical living Reptiles and the Bones of other Animals" and on "Similitudes of the Bones in the Enaliosauria" in the 'Journal' of the Linnean Society (Zoology), vol. xii. In 1876 he was appointed Professor of Geography in King's College, London, and Professor of Geography and Geology in Queen's College, London, holding both these Professorships until his death. From 1891 until the closing of the institution, he was also Lecturer on Geology and Mineralogy in the Royal Indian Engineering College, Cooper's Hill; and from 1896 onwards he was Professor of the same subjects at King's College. Prof. Seeley also undertook much popular lecturing and teaching, and was for many years one of the Gilchrist Lecturers. In 1889 he obtained a grant from the Royal Society to enable him to visit South Africa and Russia to collect and study the extinct Anomodont Reptiles; and the most important results of his work were published in a series of memoirs in the 'Philosophical Transactions.' He discovered and described the well-known skeletons of *Pariasauros bairdi* and *Cynognathus crateronotus* besides many other important specimens, which are now exhibited

in the British Museum. A portrait of Prof. Seeley and a list of his scientific papers were published in the 'Geological Magazine' for June 1907 (dec. 5, vol. iv. pp. 245-253, pl. xii.).

[A. SMITH WOODWARD.]

GEORGE SIM, A.L.S. since 2nd December, 1886, was the son of a general merchant at Craigellachie, where he was born on 26th March, 1835. He received but little education as a child, and in 1848, when 13 years old, he was apprenticed to a tailor in Auchterless; after $4\frac{1}{2}$ years he became journeyman to the same master, and remained some time longer with him, till, in consequence of his employer's increasing love of drink, he became ruined, and Sim had to find work elsewhere. This experience deeply impressed him, and led him by precept and example to endeavour to save his fellow-workmen from that habit which had proved fatal to the master.

As a journeyman tailor he moved about in various parts of Great Britain and Ireland, till in 1857 he tried his fortune by setting up a shop in Turriff, but soon afterwards a brother induced him to join in buying a druggist's business in Tarland, where they spent about two years. The business did not equal their hopes, so it was sold, and on leaving Tarland George Sim resolved to improve his knowledge of taxidermy by a regular training under Mr. Sandison, of Edinburgh. After a short visit to London, he went to Aberdeen in 1862, and began business in King Street as a naturalist and preparator. His success enabled him to move, in a few years, to Castle Street, where he also sold antiquarian articles; his integrity and skill were so known and valued, that this branch became largely extended and successful.

He had married before settling in Aberdeen, where his wife and child lived during his search for fortune in London. After his establishment in business, he was assiduous in field-work at such hours as could be snatched from business; he did not spare himself, working early and late. In 1878 he published in the 'Transactions' of the Aberdeen Natural History Society his "List of the Crustacea of the North-East Coast of Scotland," and a "Catalogue of Fish found in the vicinity of Aberdeen" by the late Dr. Dyce and Sim. His collections in both groups were given by him to the University of Aberdeen shortly before his death. His quarto note-books, from 1862 to 1890, with drawings interspersed, were given to the Aberdeen Free Library. Many short notes in Naturalist's Journals were written by him, till in 1903 he published in Aberdeen 'The Vertebrate Fauna of Dee,' a handsome octavo volume of nearly 300 pages.

The scanty education of his youth was largely made good by private study, and he was an omnivorous reader. In his later years he travelled in France, Italy, and other parts of Europe, visiting museums and other places of interest to a naturalist.

He is described as reserved and silent with strangers; of spare

frame and almost ascetic appearance, which seemed unequal to the demands his business and relaxation made upon it, but he reached the age of 73, dying in his home at Aberdeen on the 15th June, 1908.

The writer of these lines is indebted to the kindness of Prof. J. W. H. Trail, F.R.S., for the information contained in an unpublished memoir, with portrait, to be issued in the 'Annals of Scottish Natural History,' which has permitted of this notice being drawn up. [B. D. J.]

ALEXANDER WHITE.—Alexander Whyte was born at Fettercairn, Kincardineshire, as the son of the Rev. A. Whyte, M.A., on March 5th, 1834. He was educated at the Parish School there, and, in 1850, entered the University of Aberdeen, where he proved proficient in classics as well as in natural history, and especially in botany. Without taking his degree he left for family reasons for the West Indies, and proceeded later on to Ceylon, where he lived until 1890, when he returned to London. His keen interest in natural history and experience as collector, chiefly of geological objects, recommended him to Mr. (now Sir) H. H. Johnston when preparing for his departure as Commissioner for British Central Africa, and he attached him as principal scientific officer to his staff. Alexander Whyte left for Africa in March 1891. Having stayed six years with Sir H. H. Johnston, he was in 1898 transferred to Uganda, and in 1902 appointed Director of Agriculture for British East Africa. He retired the following year; but his energy was by no means exhausted. At the age of 70 he went to Liberia, in the interest of a company, to explore the forest-belt in the interior for rubber-plants. In spite of great hardships and a severe attack of dysentery he successfully executed his commission, and returned home in apparently unimpaired health in 1905. He died at High Barnet, Hertfordshire, on December 21st of the present year.

His activity as botanical collector dates from 1891, when he explored the M'lanje Mountains in British Central Africa. The very important collections made on that occasion went to the British Museum, and formed the subject of a paper by the officers of the botanical department of that institution in the 'Transactions' of the Linnean Society, Ser. 2, Botany, vol. iv. pp. 1-67 (1894). His later very extensive collections from British Central Africa, Uganda, and British East Africa are mostly at Kew, and, so far, only partially worked up ('Flora of Tropical Africa'). Perhaps his most valuable contribution was from Liberia, a country which until then was, apart from certain parts of the littoral, botanically almost unexplored. The results of this expedition were incorporated in Sir H. H. Johnston's 'Liberia,' and the new species described in the 'Journal' of the Linnean Society, vol. xxxvii. pp. 79-115 (1905). The number of new species discovered by him is very considerable, and not a few have been associated with him

by their specific designations, among them the M'lanje Cypress, *Widdringtonia Whytei*. The value of his collections would have been still greater had he paid more attention to labelling and writing down his observations. That he was a good observer and also had the literary power of putting into words what he saw will be admitted by those who had an opportunity of listening to his accounts or reading the manuscript report of his expedition to Liberia.

In 1877 Alexander Whyte was elected a Fellow of the Zoological Society, who in 1894 made him an Honorary Fellow and in 1897 awarded him their Silver Medal. His Fellowship of the Linnean Society dates from 1894. [O. S.]

June 3rd, 1909.

Dr. D. H. SCOTT, F.R.S., President, in the Chair.

The Minutes of the Anniversary Meeting of the 24th May, 1909, were read and confirmed.

Mr. Richard Siddoway Bagnall was proposed as a Fellow.

The Lady Isabel Mary Peyronnet Browne, Capt. Stanley Smyth Flower, Mr. Valavanur Subramania Iyer, M.A. Madras Univ., Miss Julia Lindley, and Mr. William Robert Price, B.A. Cantab., were elected Fellows.

The President announced that he had appointed the following as Vice-Presidents for the ensuing year:—Sir Frank Crisp, Mr. Horace W. Monckton, Prof. E. B. Poulton, and Lieut.-Col. Prain.

The first exhibition was by Prof. DENDY, F.R.S., Sec.L.S., of photomicrographs showing nuclear division in *Galtonia candicans*, Deene., and nuclear division and fertilization in *Ascaris megalocephala*.

The President added some observations on the interest of these slides.

Mr. A. D. COTTON, F.L.S., showed dried and recent specimens in formalin, of *Colpomenia sinuosa*, Derbès & Sol., from Weymouth, explaining how this Mediterranean species had advanced during the last few years up the French coast, into the English Channel; it was believed to act injuriously to young oysters, by breaking them adrift on its rising by buoyancy when distended with air.

An animated discussion followed in which the following joined:—Mr. E. M. Holmes, Dr. J. C. Willis, Prof. Dendy, and Mr. J. C. Shenstone, Mr. Cotton replying.

The following papers were read :—

1. "On *Calamites* (*Calamitina*) *Schutzei*, Stur., and on the correspondence between the length of internodes and the position and function of the short internode in the genus *Calamites* and in the recent *Equisetaceæ*." By A. R. HORWOOD. (Communicated by E. E. LOWE, F.L.S.)
2. "Cephalocorda—*Amphioxides*—of the 'Sealark' Expedition." By H. O. S. GIBSON, B.A. (Communicated by J. STANLEY GARDINER, F.R.S., F.L.S.)
3. "Alcyonaria of the 'Sealark' Expedition." By Prof. J. ARTHUR THOMSON. (Communicated by the same.)

June 17th, 1909.

Sir FRANK CRISP, Vice-President, in the Chair.

The Minutes of the General Meeting of the 3rd June, 1909, were read and confirmed.

Mr. Thomas Parkin, M.A., was proposed as a Fellow.

Mr. William Booth Waterfall, Mrs. Mary Jane Longstaff, Mr. Richard Williams Harold Row, and Mr. William Robert Price, B.A. Cantab., were admitted Fellows.

Mr. William Dennis and Mr. Edward John Woodhouse, B.A. Cantab., were elected Fellows.

A letter congratulating Sir Joseph Hooker on his approaching 92nd birthday was read from the Chair, and signed by the Fellows present.

The following papers were read :—

1. "On the Growth of a Species of *Battarea*." By J. G. OTTO TEPPER, F.L.S. (Abstract, see p. 54.)
2. "The Deposits in the Indian Ocean." By Sir JOHN MURRAY, K.C.B., F.R.S., F.L.S.
3. "The 'Sealark' Penaeidea, Stenopidea, and Reptantia." By L. A. BOBBADAILE. (Communicated by J. STANLEY GARDINER, M.A., F.R.S., F.L.S.)
4. "The 'Sealark' Polychæta." By F. A. POTTS. (Communicated by the same.)
5. "The 'Sealark' Lepidoptera." By T. BAINBRIDGE FLETCHER. (Likewise communicated.)
6. "Report on the Porifera collected by Mr. CYRIL CROSSLAND in the Red Sea; Part I. Calcarea." By R. W. HAROLD Row, B.Sc., F.L.S.

7. "New Species of Malesian and Philippine Ferns." By Dr. H. CHRIST. (Communicated by Fleet-Surgeon C. G. MATTHEW, M.B., F.L.S.)
8. "The African Species of *Triumfetta*, Linn." By T. A. SPRAGUE, F.L.S., and J. HUTCHINSON.
9. "The Acaulescent Species of *Malvastrum*, A. Gray." By ARTHUR W. HILL.

ABSTRACT.

NOTES on the Growth and Development of a Specimen of a
South-Australian *Battarea*. By J. G. O. TEPPER, F.L.S.

[Read 17th June, 1909.]

IN April 1900 the specimen in question was received from Miss UNA A. WARE, of Dalkey, 17 miles north of Adelaide, in the "Mallee Scrub" of dwarf *Eucalyptus*. It consisted of a fully-developed *Battarea* from base to pileus, with a solid, heavy, tuber-like mass attached. The specimen was shown on 1st May, 1900, at a meeting of the Royal Society of South Australia (Trans. xxiv. p. 171). A few days later spores were abundantly shed, and the specimen bedded in sand and covered with a bell-glass, and for nearly a month it continued to develop in height. It was again shown to the R. Society of South Australia on 6th June, when the following dimensions were noted:—

Total height from base to summit ..	235 mm.
Pileus, diameter	42 "
Stipes, at summit	12 "
" 75 mm. below the summit ..	20 "

Peridium whitish when fresh, irregularly hemispherical and smooth, except some slight irregular furrows.

The specimen was handed to Dr. M. HOLTZE, F.L.S., Director of the Adelaide Botanic Garden, and is there preserved in the Herbarium. No other specimen has been recently found, but it has been suggested that it may belong to *Battarea phalloides*, Dicks. The other Australian species known are *B. Muelleriana*, Kalchb., from Yorke's Peninsula, and *B. Tepperiana*, Ludw., from N.W. Victoria.

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Pp. 75; with 4 plates and portraits. 1908.

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4to. *Monaco*, 1908-1909.

XXXIII. Crustacés décapodes (Pénéides) provenant des campagnes de
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BOUVIER. Pp. 122; plates 16. 1908.

XXXIV. Échinodermes provenant des campagnes du yacht *Princesse-
Alice* (Astéries, Ophiures, Échinides et Crinoïdes). Par R.
KOEHLER. Pp. 317; plates 32. 1909.

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1901.

Hon. Charles Ellis, Hon. Walter Rothschild, and the Bentham Trustees : The Correspondence of William Swainson.

Royal Society : Contribution towards Mr. F. Chapman's paper on Funafuti Foraminifera, £50.

Prof. E. Ray Lankester : Contribution towards illustration, £30 5s.

Portrait of Dr. St. G. J. Mivart ; presented by Mrs. Mivart.

1903.

Royal Society : Contribution toward Dr. Elliot Smith's paper, £50.

Legacy from the late Dr. R. C. A. Prior, £100 free of duty.

Mrs. Sladen : Posthumous Portrait of the late Walter Percy Sladen, by H. T. Wells, R.A.

B. Arthur Bensley, Esq. : Contribution to his paper, £44.

1904.

Royal Society : Grant in aid of third volume of the Chinese Flora, £120.

Supplementary Royal Charter : cost borne by Frank Crisp, Esq.

1905.

Royal Society : First grant in aid of Dr. G. H. Fowler's ' Biscayan Plankton,' £50.

Executors of the late G. B. Buckton, Esq. : Contribution for colouring plates of his paper, £26.

1906.

Royal Society : Second grant towards ' Biscayan Plankton,' £50

Subscription portrait of Prof. S. H. Vines, by Hon. John Collier.

Royal Swedish Academy of Science : Copies of portraits of C. von Linné, after Per Krafft the elder, and A. Roslin, by Jean Haagen.

1907.

Royal University of Uppsala : Copy by Jean Haagen of portrait of C. v. Linné, by J. H. Scheffel (1739).

Royal Society : Third and final grant towards ' Biscayan Plankton,' £50.

The Trustees of the Percy Sladen Memorial Fund : First grant towards publication of Mr. Stanley Gardiner's Researches in the Indian Ocean in H.M.S. ' Sealark,' £200.

1908.

Prof. Gustaf Retzius : Plaster cast of bust of Carl von Linné, modelled by Walther Runeberg from the portrait by Scheffel (1739) at Linnés Hammarby ; the bronze original is for the façade of the new building for the Royal Academy of Science, Stockholm.

Miss Sarah Marianne Silver, F.L.S. : Cabinet formerly belonging to Mr. S. W. Silver, F.L.S.

1909.

The Trustees of the Percy Sladen Memorial Fund : Second grant towards publication of Mr. Stanley Gardiner's Researches in the Indian Ocean in H.M.S. 'Sealark,' £200.

Prof. James William Helenus Trail, F.R.S., F.L.S. : Gift of £100 in Trust, to encourage Research on the Nature of Proto-plasm.

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- Smith, Geoffrey W., Freshwater Crustacea from Tasmania, 5.
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- Whyte, A., deceased, 19; obituary, 51.
- Wigglesworth, Miss G., admitted, 1.
- Williams, Miss A. F. S., admitted, 6; elected, 5; proposed, 1.
- Williams, F. N., appointed Scrutineer, 32.
- Williams, J. M., elected, 3.
- Williams, J. W., removed from List, 19.
- Wilsmore, Mrs. L., Zoanthæ from Queensland and the New Hebrides, 17.
- Wilson, G., admitted, 13; elected, 9; proposed, 6.
- Windsor Castle visited by the President and Bot. and Gen. Secs., 2.
- Wistaria* stems, slides exhibited (Gerard), 4.
- Withdrawals recorded, 19.
- Woodhouse, E. J., elected, 54; proposed, 17.
- Woodward, Dr. A. S., Councillor retired, 32.
- Worsdell, W. C., exhibited forms of *Selaginella*, 6.
- Yew and *Wistaria* stems, slides exhibited (Gerard), 4.
- Zoanthæ from Queensland, etc. (Wilsmore), 17.
- Zoological Secretary elected, 32.

Publications of the Society issued during the period, 31st July,
1908, to 31st July, 1909 :—

Journal (Botany), No. 267, 13th Oct., 1908.
„ 268, 15th Feb., 1909.
„ 269, 11th Mar., 1909.
„ (Zoology), No. 198, 30th Sept., 1908.
„ 199, 6th July, 1909.
„ 204, 11th Nov., 1908.
„ 205, 8th Mar., 1909.

Transactions (2nd Ser.) Botany, Vol. VII. Part x., Dec. 1908.
„ xi., Feb. 1909.
„ xii., July 1909.
(2nd Ser.) Zoology, Vol. XI. Part i., Dec. 1908.
„ ii., Mar. 1909.
„ iii., Apr. 1909.
„ iv., June 1909.
„ v., July 1909.

Proceedings, 120th Session, from November 1907 to June 1908 :
October 1908.

List of [Fellows, Associates, and Foreign Members], 1908–1909.